# FINAL

# FORMER MARCH AIR FORCE BASE, CALIFORNIA
# OPERABLE UNIT 2
# AIR FORCE REAL PROPERTY AGENCY
# RECORD OF DECISION
# APRIL 2004

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Original

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## TABLE OF FIGURES

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# LIST OF ACRONYMS

| | |
|---|---|
| 1,1,1-TCA | 1,1,1-trichloroethane |
| 1,1-DCE | 1,2-dichloroethene |
| 1,2-DCA | 1,2-dichlorethane |
| 1,4-DCB | 1,4-dichlorobenzene |
| AFB | Air Force Base |
| AFHQ | Air Force Headquarters |
| AFRC | Air Force Reserve Command |
| AFRPA | Air Force Real Property Agency |
| AMC | Air Mobility Command |
| ANG | Air National Guard |
| ARARs | Applicable or Relevant and Appropriate Requirements |
| bgs | below ground surface |
| CE | Civil Engineering |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COPC | Chemical of Potential Concern |
| COPECs | Chemicals of Potential Ecological Concern |
| CSF | Cancer Slope Factor |
| DTSC | Department of Toxic Substances Control |
| EPA | Environmental Protection Agency |
| EPN | ethyl-p-nitrophenyl phenyl phosphorothioate |
| FFA | Federal Facilities Agreement |
| H&SC | Health and Safety Code |
| HEAST | Health Effects Assessment Summary Tables |
| HI | Health Index |
| HQ | Hazard Quotient |
| IC | Institutional Control |
| IRIS | Integrated Risk Information System |
| IRP | Installation Restoration Program |
| LOAEL | Lowest Observable Adverse Effects Level |
| LUC | Land Use Covenant |
| MCLs | Maximum Contaminant Levels |

| | |
|---|---|
| MDL | Method Detection Limit |
| MEK | methyl ethyl ketone |
| MCPA | (4-chloro – 2-methylphenoxy) acetic acid |
| MEPP | 2- (4-chloro – 2-methylphenoxy) propanoic acid (mecoprop) |
| µg/kg | micrograms per kilogram |
| µg/L | microgram per liter |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| MSL | Mean Sea Level |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NOAEL | No Observable Adverse Effects Level |
| NPL | National Priorities List |
| O&M | Operation and Maintenance |
| OU | Operable Unit |
| PAH | polynuclear aromatic hydrocarbon |
| PCBs | polychlorinated biphenyls |
| PCE | tetrachloroethene |
| PRGs | Preliminary Remediation Goals |
| RAB | Restoration Advisory Board |
| RCRA | Resource Conservation Recovery Act |
| RDX | Explosive Residue (Cyclonile) |
| RfD | Reference Dose |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RTV | Reference Toxicity Value |
| RWQCB | Regional Water Quality Control Board |
| SAC | Strategic Air Command |
| SARA | Superfund Amendments and Reauthorization Act |
| SF | Slope Factor |
| SKR | *Stephens' Kangaroo Rat* |
| TCE | trichloroethene |
| TEFs | Toxicity Equivalency Factors |
| TPH | Total Petroleum Hydrocarbons |
| TRPH | Total Recoverable Petroleum Hydrocarbons |

| | |
|---|---|
| TSDF | Treatment, Storage, and Disposal Facility |
| UCL | Upper Confidence Limit |
| USACE | United States Army Corps of Engineers |
| UST | Underground Storage Tank |
| VA | Veterans Administration |
| VOCs | volatile organic compounds |

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# DECLARATION

## SITE NAME AND LOCATION

Air Force Real Property Agency Sites in Operable Unit 2
Former March Air Force Base
Riverside County, California

## STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial actions for certain Operable Unit 2 (OU2) sites controlled by the Air Force Real Property Agency (AFRPA) at the former March Air Force Base (March AFB), Riverside County, California. The U.S. Air Force (Air Force) developed this Record of Decision (ROD), hereinafter referred to as the AFRPA OU2 ROD in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), [40 Code of Federal Regulations (CFR), Part 300]. This decision document is based on information contained in the Remedial Investigation/Feasibility Study (RI/FS) report for OU2 dated July 1997 and the administrative record for March AFB.

These AFRPA OU2 sites are in areas that have been declared excess property and will be transferred from Air Force control. The remaining OU2 sites are controlled by the Air Force Reserve Command (AFRC). The OU2 sites controlled by the AFRC will be addressed in a separate ROD.

This AFRPA OU2 ROD documents the Air Force's and EPA's selection of remedial alternatives at a total of 15 sites. Institutional Controls (ICs) are required to address waste left in place at four sites, with additional controls required to protect waste cells on one site, and 11 sites do not pose a threat to human health and the environment on the former March AFB. Many of these sites were contaminated with substances such as, solvents, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and landfill debris during the earlier years of base operations. These 15 sites are now the responsibility of the AFRPA, which is working to transfer former base property to the community for reuse. The Air Force and EPA are selecting these remedies with the concurrence of the U.S. Environmental Protection Agency (EPA) Region IX and the State of California, under guidelines established in the Federal Facilities Agreement (FFA), signed on 27 September 1990 by representatives of EPA Region IX, the State of California, and the Air Force.

## ASSESSMENT OF THE SITES

Actual or threatened releases of hazardous substances from the AFRPA OU2 sites, if not addressed by implementation of the response actions assessed in the OU2 RI/FS and selected in this ROD, may, in some cases, present a current or potential future threat to public health and welfare, and/or the environment, including groundwater resources.

## DESCRIPTION OF THE SELECTED RESPONSE ACTIONS

The response actions address the documented principal public health and environmental threats associated with 15 AFRPA sites identified as Installation Restoration Program (IRP) Sites 3, 6, 12, 17, 19, 20, 22, 23, 24, 25, 26, 30, 35, 40, and 42. The locations of these sites are shown in Figure D-1 – Location of OU2 Sites, and a brief site description is included in Table D-1 – Site Status Summary. The southern portion of Site 22 is located in AFRPA-controlled area while the northern portion is located in AFRC-controlled area. However, this site will be not discussed in the AFRPA OU2 ROD. Originally, Site 41, the Hawes site near Barstow, California, was part of OU2. It was later removed from OU2 and will be discussed under a separate decision document. As shown in Figure D-1, Sites 1, 2, 8, 11, 27, 36, 37, and 39 are located in AFRC-controlled areas.

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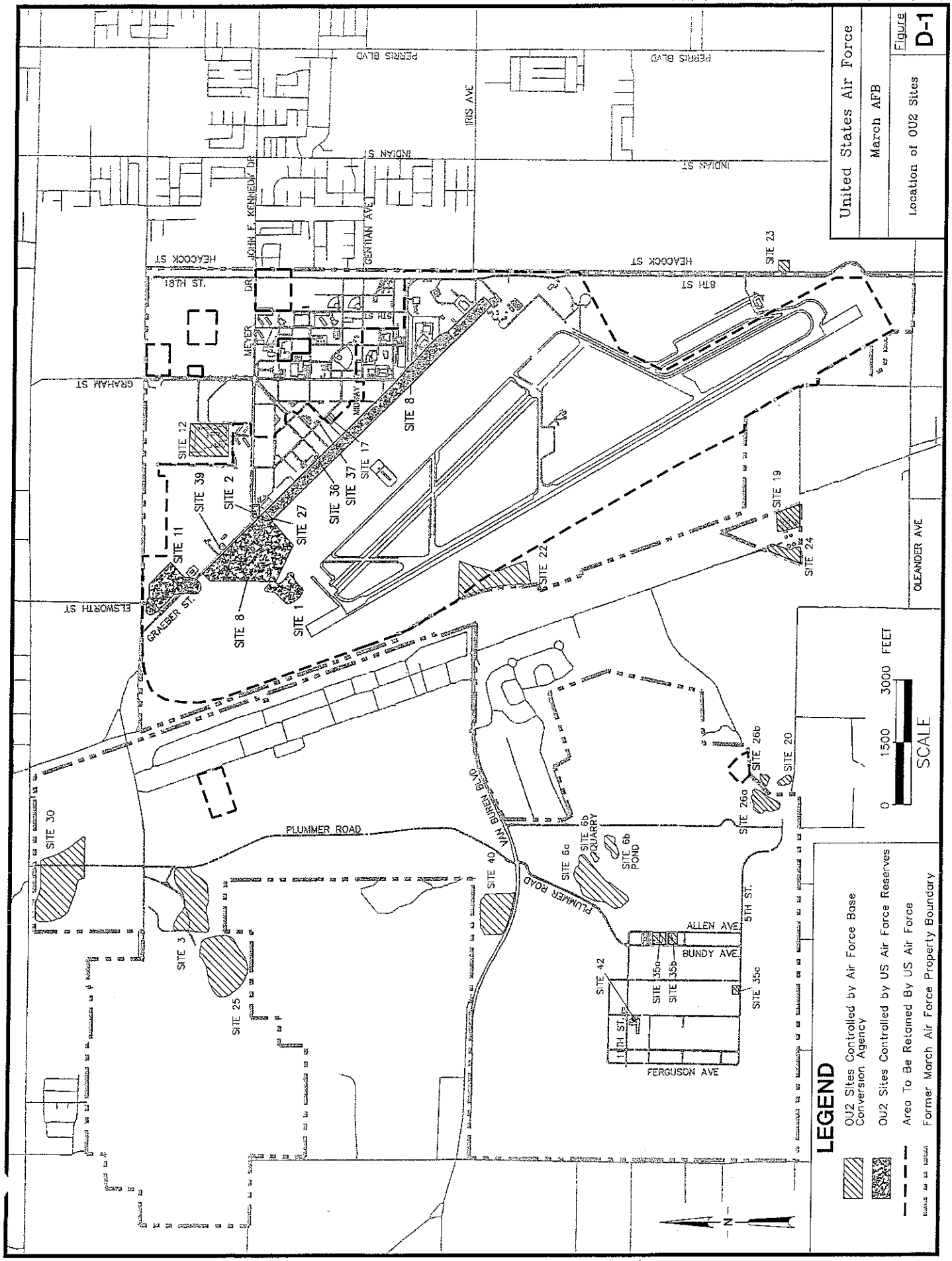
United States Air Force
March AFB
Location of OU2 Sites
Figure D-1
PERRIS BLVD
IRIS AVE
INDIAN ST
JOHN F. KENNEDY DR
CENTRAL AVE
HEACOCK ST
18TH ST.
8TH ST
MEYER
GRAHAM ST
MIDWAY
ELSWORTH ST
GRAEBER ST.
OLEANDER AVE
SITE 1
SITE 2
SITE 8
SITE 11
SITE 12
SITE 17
SITE 19
SITE 20
SITE 22
SITE 23
SITE 24
SITE 25
SITE 26a
SITE 26b
SITE 27
SITE 30
SITE 35a
SITE 35b
SITE 35c
SITE 36
SITE 37
SITE 39
SITE 40
SITE 42
SITE 6a
SITE 6b QUARRY
SITE 6b POND
PLUMMER ROAD
VAN BUREN BLVD
ALLEN AVE
BUNDY AVE
5TH ST.
11TH ST.
FERGUSON AVE
0 1500 3000 FEET
SCALE
N
LEGEND
OU2 Sites Controlled by Air Force Base Conversion Agency
OU2 Sites Controlled by US Air Force Reserves
Area To Be Retained By US Air Force
Former March Air Force Property Boundary

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## TABLE D-1
## SITE STATUS SUMMARY
## AFRPA-CONTROLLED OU2 SITES

| Site No. | Description | Interim Removal Action Performed | Soil Cleanup Action Required | Groundwater Cleanup Action Required | ICs Required |
|---|---|---|---|---|---|
| 3 | Landfill No. 5 | Yes | No | No | No |
| 6 | Landfill No 4 | Yes | No | No | Yes (land use restrictions, groundwater use restrictions, protection of landfill equipment or systems, and State Land Use Covenant) |
| 12 | Civil Engineering Yard | Yes | No | No | Yes (protection of groundwater monitoring equipment or systems; groundwater use restrictions, and State Land Use Covenant) |
| 17 | Swimming Pool Fill | Yes | No | No | Yes (land use restrictions, soil disturbance restriction, and State Land Use Covenant) |
| 19 | West March Sludge Drying Beds | No | No | No | Yes (land use restrictions, soil disturbance restriction, protection of fences, barriers or signs, and State Land Use Covenant) |
| 20 | Landfill No. 7 | Yes | No | No | No |
| 22 | Landfill No. 2 | No | No | No | No |
| 23 | East March Effluent Pond | No | No | No | No |
| 24 | Landfill No. 1 | Yes | No | No | No |
| 25 | Munitions Residue Burial Site | Yes | No | No | No |
| 26 | Water Treatment Plant Sludge | Yes | No | No | No |
| 30 | Construction Rubble Burial Site | No | No | No | No |
| 35 | 15th Air Force Headquarters Leaking Underground Storage Tanks | Yes | No | No | No |
| 40 | Landfill No. 8 | Yes | No | No | No |
| 42 | Building 3404 Transformers | Yes | No | No | No |

Interim removal actions have been performed at 11 sites to mitigate potential risk to human health and the environment from contaminated soils and/or landfill materials. These include Sites 3, 6, 12, 17, 20, 24, 25, 26, 35, 40, and 42. Removal actions have achieved cleanup levels allowing for the unrestricted use of eight sites (3, 20, 24, 25, 26, 35, 40, and 42). Engineered waste cells were constructed at Site 6 and contain contaminated soils from several sites. Residual contamination remains in groundwater at Site 12 and in subsurface soils at Site 17. Surface and near surface soils at Site 19 are contaminated from former operations at the adjacent wastewater treatment facility.

The institutional controls (ICs) alternative, in the form of groundwater and/or land use restrictions and state land use covenants, has been selected for Sites 6, 12, 17 and 19. Site 6 also requires ongoing operations and maintenance of the engineered waste cells, maintenance of the waste cells' associated engineered structures, groundwater sampling to monitor the integrity of the engineered waste cells, and an investigation for landfill gas generation and migration. Descriptions of the selected institutional controls and other requirements for Sites 6, 12, 17 and 19 are provided in Section 9.0 of this AFRPA OU2 ROD. No contamination requiring action was found during remedial investigations at Sites 22, 23, or 30.

As a part of the selected ICs Alternative, the Air Force will execute a State Land Use Covenant with the State before transfer of title to a non-federal entity of property including one or more of Site 6, 12, 17 and 19. The State Land Use Covenant will include the restrictions described in Section 9, legal descriptions of the property and affected areas, and provisions for regulatory agency access. The State Land Use Covenant will be recorded before the recording of the federal deed.

Site descriptions, including site history and primary contaminants encountered and summaries of risk assessments and the selection of remedial alternatives, are provided in Sections 5 through 9 of this AFRPA OU2 ROD.

A variety of applicable cleanup methods were evaluated for each site requiring remediation. A preferred alternative was selected based on a variety of factors, including cost, for each site. A summary of selected alternatives is provided below on a site-specific basis. Five-year reviews to ensure the continued protection of human health and the environment will be required as specified in CERCLA and the FFA.

## SOIL CONDITIONS AND CLEANUP METHODS

### Sites Requiring No Further Action – Soil

Interim removal actions were conducted at 11 sites (Sites 3, 6, 12, 17, 20, 24, 25, 26, 35, 40 and 42). At Sites 3, 20, 24, 25, 26, 35, 40 and 42, cleanup goals were attained and no further action is necessary to ensure protection of human health and the environment. No further action is also selected for Sites 22, 23, and 30, because no evidence of soil contamination was found or concentrations were below levels necessary to protect human health and the environment.

### Sites Requiring ICs

ICs are selected for four sites with residual contamination, including sites where removal actions have occurred.

***Site 6 - Landfill No. 4.*** Elevated levels of polynuclear aromatic hydrocarbons (PAHs), dioxins, volatile organic compounds (VOCs), herbicides, and pesticides were found in Site 6 surface soils. Approximately 89,000 cubic yards of soil and trash were removed from Site 6. This material and non-hazardous soil and wastes removed from several other March AFB sites, approximately 600,000 cubic yards, were placed into two engineered waste cells that were constructed on a portion of Site 6. The cells were capped in January 1996. Restrictions in the deed in the form of grantee covenants will prohibit future residential land use and any activities that could jeopardize the cap or liner's ability to protect the integrity of the waste cells. Additional restrictions are detailed in the existing *Operations and Maintenance Work Plan – Operable Unit 2, Site 6, Landfill No. 4 – March Air Force Base, California* (July 1999) to ensure protection of the engineered waste cells constructed during the 1996 removal action. Within 180 days of the execution of this Record of Decision, the Air Force will submit to the regulatory agencies for review and approval a revised Operations and Maintenance (O&M) Work Plan that include sampling and monitoring requirements for landfill gas in accordance with California Code of Regulations, Title 22 and Title 27. The revised O&M Work Plan will also include requirements of ICs implementation, monitoring, reporting and enforcement. In addition, prior to transfer of title to the property including Site 6, the Air Force will execute a State Land Use Covenant with the State that includes these selected land use restrictions. The State Land Use Covenant will be recorded before the deed to the property.

***Site 12 - Civil Engineering Yard.*** Surface and near-surface soils were contaminated with a variety of hazardous substances, including PAHs and hexavalent chromium. About 2,000 cubic yards of non-hazardous soils were removed from this area and disposed of in the Site 6 engineered waste cells. Post-removal sampling results show residual soil contamination levels at acceptable residential risk levels. Low-level tetrachloroethene (PCE) and trichloroethene (TCE) contamination in the groundwater under Site 12 appears to be confined to a small area within site boundaries. Restrictions in the deed in the form of grantee covenant

will prohibit any activities that would disturb or limit any groundwater monitoring equipment or systems, and prohibit groundwater extraction for any purpose other than monitoring. In addition, prior to transfer of title to the property including Site 12, the Air Force will execute a State Land Use Covenant with the State that includes these selected land use restrictions. The State Land Use Covenant will be recorded before the deed to the property.

***Site 17 - Swimming Pool Fill.*** Elevated levels of polychlorinated biphenyls (PCBs) were found in subsurface soils at depths of 8.5 and 11.5 feet below ground surface (bgs). The PCBs were detected in soil samples collected beneath the concrete floor of the former pool after removal of the pool contents and structures in 1994. Restrictions in the deed in the form of grantee covenants will prohibit future residential land use, and prohibit any activity that will disturb the soil at or below 7 feet below ground surface. In addition, prior to transfer of title to the property including Site 17, the Air Force will execute a State Land Use Covenant with the State that includes these selected land use restrictions. The State Land Use Covenant will be recorded before the deed to the property.

***Site 19 - West March Sludge Drying Beds.*** PAHs, PCBs, thallium, and hexavalent chromium have affected surface and near-surface soils at Site 19. Restrictions in the deed in the form of grantee covenants will prohibit future residential land use, prohibit any activity that will disturb the soil in the former sludge drying pits, and prohibit activities that result in removal, disturbance or other interference with fences or other barriers to access to or signs notifying the public of Site 19. In addition, prior to transfer of title to the property including Site 19, the Air Force will execute a State Land Use Covenant with the State that includes these selected land use restrictions. The State Land Use Covenant will be recorded before the deed to the property.

The total conservatively estimated annual cost to implement the selected remedies (ICs) for the OU2 AFRPA sites is $43,000. No capital costs are associated with the selected remedies for the OU2 AFRPA sites.

**STATUTORY DETERMINATIONS**

The selected remedy for soil (land use restrictions/institutional controls) for Sites 6, 17, and 19 are protective of human health and the environment. The remedy complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial actions, and is cost effective. However, this remedy does not provide permanent solutions and does not involve alternative treatment technologies. In addition, this remedy does not satisfy the statutory preference for treatment as a principal element because contaminants would be left on-site untreated.

The selected remedy for contaminated groundwater (land use restrictions/institutional controls) at Site 12 is protective of human health and the environment. The remedy complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial actions, and is cost effective. This remedy does not provide a permanent solution and alternative treatment (other than natural attenuation) or resource recovery technologies to the maximum extent practicable or satisfy the statutory preference for remedies that would result in reduction of toxicity, mobility, or volume of contaminants.

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This AFRPA OU2 ROD may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Signature
ALBERT F. LOWAS, JR., Director
Air Force Real Property Agency
United States Air Force

May 14, 2004
Date

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This AFRPA OU2 ROD may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Signature

5/11/04
Date

KATHLEEN H. JOHNSON, Chief
Federal Facilities and Site Cleanup Branch
U.S. Environmental Protection Agency, Region IX

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This AFRPA OU2 ROD may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Signature

May 17, 2004
Date

JOHN E. SCANDURA, Chief
**Southern California Branch**
**Office of Military Facilities**
Department of Toxic Substances Control
California Environmental Protection Agency

This AFRPA OU2 ROD may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Signature

5/12/04
Date

GERARD J. THIBEAULT, Executive Officer
California Regional Water Quality Control Board
Santa Ana Region


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# DECISION SUMMARY:

# 1.0 SITE NAME, LOCATION & DESCRIPTION

# 1.0 SITE NAME, LOCATION, & DESCRIPTION

## 1.1 LOCATION

The former March AFB (or the "Base") is located at the northern end of the Perris Valley, east of the city of Riverside, in Riverside County, California. The Base is approximately 60 miles east of Los Angeles and 90 miles north of San Diego (Figure 1-1). It lies in sections of Township 3 South, Range 4 West and covers portions of the Riverside East, Steele Peak, and Sunnymead quadrangle maps. Interstate 215 (I-215) bisects the Base in a northwest-southeast direction. The portion of the Base east of the freeway is commonly referred to as the Main Base, and the portion to the west is referred to as West March. Realignment of the Base in 1996 established March Air Reserve Base (ARB), a major Air Force Reserve Command (AFRC) base that occupies a majority of the main base portion of March AFB.

When realigned (partially closed) in April 1996, March AFB covered 6,605 acres. It has been used for aircraft maintenance and repair, refueling operations, and training activities since 1918. In 1980, the Installation Restoration Program (IRP) was developed by the Department of Defense as the mechanism for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. Section 9601) process, incorporating applicable RCRA regulations as well as meeting requirements of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) (40 CFR Part 300). The Air Force conducted a Phase I records search of 30 potentially contaminated IRP sites on the Base. There are now a total of 44 IRP sites at the former March AFB and current March ARB.

The primary contaminants identified in the IRP include chlorinated solvents, fuels, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs). Contamination by PAHs and PCBs appears to be restricted to surface and near-surface soils whereas fuel hydrocarbons and solvents tend to be predominant contaminants in subsurface soils and groundwater.

The lead agency for cleanup of the closed portions of March AFB is the Air Force. The U.S. Environmental Protection Agency (USEPA), the California Department of Toxic Substances Control (DTSC), and the Santa Ana Regional Water Quality Control Board (RWQCB) are all support agencies for cleanup activities at the Base. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number assigned to the Base is CA4570024527.

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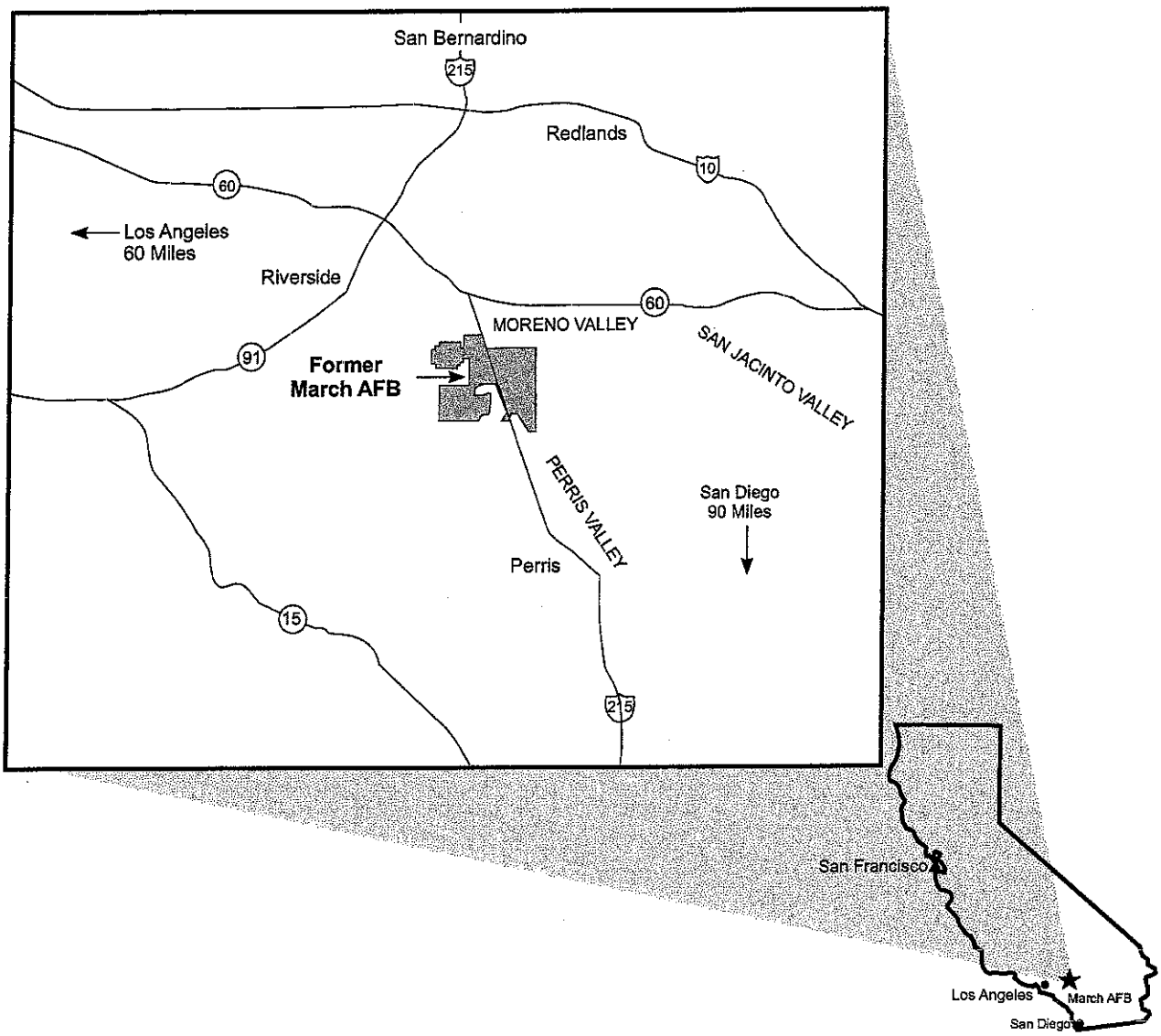


| United States Air Force | |
|---|---|
| Former March AFB | |
| Location of Former March Air Force Base | **Figure** 1-1 |

X:\GIS\0058-20\LOC_MAP.CDR 8/31/2000

# DECISION SUMMARY:
# 2.0 - SITE HISTORY & ENFORCEMENT ACTIVITIES

# 2.0 SITE HISTORY & ENFORCEMENT ACTIVITIES

March AFB opened on March 1, 1918, as the Alessandro Aviation Field. This 640-acre facility was used during World War I as a training center for Curtis JN1 "Jenny" aircraft pilots. After World War I, the Base closed for about 4 years and reopened in 1927. By 1938, March AFB was considered the central location for bombing and gunnery training on the West Coast. During World War II, Camp Haan Army Base was constructed along the west side of I-215 (then Highway 395). Camp Haan extended from Alessandro Boulevard south along the Highway to Nandina Avenue and to Barton Street to the west approximately 3 to 4 miles. Camp Haan was an anti-aircraft artillery camp and staging area for General Patton's tank force. At one time, as many as 80,000 personnel were reportedly stationed at Camp Haan, and many of the old building foundations remain. After World War II, a portion of Camp Haan became a part of March AFB. In 1949, the Base became a bomber base under command of the Strategic Air Command. In June 1991, March AFB became an Air Mobility Command installation, with primary missions of air refueling and cargo airlifts. From that time until realignment in 1996, the Base served as a main location for bombers as well as refueling and cargo aircraft. In addition, Air Force Reserve Command (AFRC) and California Air National Guard (ANG) units have operated cargo and fighter missions at the Base.

In 1993, the Base Closure and Realignment Commission designated March AFB for realignment, resulting in the transfer, by April 1996, of most active duty Air Force personnel and aircraft to Travis AFB, California. AFRC and California ANG units remained, and a portion of the Main Base was retained and redesignated as March ARB. Due to realignment, substantial areas of the Base (particularly at West March) will be transferred to civilian agencies, decreasing the 1993 area of the Base by about two-thirds.

The Air Force, at March AFB and elsewhere, has long been engaged in a wide variety of operations involving the use, storage, and disposal of hazardous materials, including fuel and solvents. Past waste disposal practices have resulted in contamination of soil and groundwater at several areas on the Main Base and on West March.

In 1980, the Air Force developed the Installation Restoration Program (IRP) to address soil and groundwater contamination at Air Force bases nationwide. The IRP process at March AFB began in 1983 with a records search that included interviews with Base personnel and research of Base records and historic aerial photographs. The records search identified 30 potentially contaminated sites and recommended further investigation of most of those sites. Since then, numerous investigations have been conducted to delineate contaminants in the soil and groundwater. There are currently 44 IRP sites at the Base, 15 of which are being addressed in the Air Force Real Property Agency (AFRPA) ROD for OU2.

In 1989, USEPA placed the Base on the USEPA National Priorities List (NPL), because of documented groundwater contamination by chlorinated solvents and other contaminants. In September 1990, the Air Force entered a Federal Facilities Agreement (FFA) with the USEPA and the State of California to facilitate the assessment and cleanup process. The FFA establishes procedures for involving federal and state regulatory agencies as well as the public in the restoration process at March AFB. This AFRPA OU2 ROD documents the appropriate institutional controls as well as the implementation and enforcement mechanisms necessary to protect human health and the environment at IRP Sites 6, 12, 17 and 19.

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# DECISION SUMMARY:
# 3.0 - HIGHLIGHTS OF COMMUNITY PARTICIPATION

# 3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Draft OU2 Remedial Investigation/Feasibility Study (RI/FS) report was released to the public in November 1996, followed by the Proposed Plan on September 8, 1997. This Proposed Plan will hereinafter be referred to as the 1997 OU2 Proposed Plan. These two documents were listed in the Administrative Record and taken to the information repositories at the Moreno Valley library and Chamber of Commerce. The notice of availability of these documents was published in the Press-Enterprise, the main local newspaper, on September 5, 1997. A fact sheet, condensed from the 1997 OU2 Proposed Plan, was sent to all persons on the March AFB mailing list, which includes Restoration Advisory Board (RAB) members, in May 1998.

The public comment period for the 1997 OU2 Proposed Plan was held from September 8 to October 8, 1997. In addition, a public meeting was held on September 9, 1997. Representatives of the Air Force, the U.S. Environmental Protection Agency (USEPA), the California Department of Toxic Substances Control (DTSC), and the Santa Ana Regional Water Quality Control Board (RWQCB), attended the public meeting to address questions about the OU2 RI/FS and the 1997 OU2 Proposed Plan. The Responsiveness Summary for this 1997 public comment period is included in Appendix A of the two draft OU2 RODs, produced in February 1998 and November 1998, both of which are part of the Administrative Record. Neither of these RODs was finalized or signed.

A new OU2 Proposed Plan, hereinafter referred to as the 2000 OU2 Proposed Plan, supersedes the 1997 OU2 Proposed Plan and addresses only those sites that are the responsibility of the AFRPA. The 2000 OU2 Proposed Plan, which was produced in its entirety, as a fact sheet, was sent to all persons on the March AFB mailing list. The public comment period for the 2000 OU2 Proposed Plan was held between August 23, 2000 and September 22, 2000. A public meeting was held on September 13, 2000 on the 2000 OU2 Proposed Plan. Representatives of the Air Force, USEPA, and California DTSC attended the public meeting to address questions about the 2000 OU2 Proposed Plan.

Responses to comments received during this public comment period are included in the Responsiveness Summary, contained in this AFRPA OU2 ROD (Appendix A). This AFRPA OU2 ROD presents the remedial actions for the OU2 AFRPA sites, located at March AFB, California. Remedial actions were selected in accordance with CERCLA, as amended by Superfund Amendments and Reauthorization Act, and the NCP. Documents relating to the selection of remedial actions for OU2 AFRPA sites at March AFB are listed in the Administrative Record Index, provided in Appendix B. Public participation in the decision-making process for OU2 AFRPA sites complied with the requirements of CERCLA §113(k)(2)(B)(I-v), 117, and the NCP 40 CFR §300.430(f)(3).

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# DECISION SUMMARY:
# 4.0 – SCOPE & ROLE OF OPERABLE UNIT 2 – AFRPA SITES

# 4.0 SCOPE & ROLE OF OPERABLE UNIT 2 – AFRPA SITES

At March AFB, aircraft maintenance, fuel storage operations, fire-training exercises, and regular Base operations have generated a variety of hazardous wastes. Past waste disposal practices have contaminated soil and groundwater in several areas on the Base. In 1989, March AFB became a Superfund site when it was added to the USEPA National Priorities List (NPL), encompassing 40 separate sites (Figure 4-1). As with many Superfund sites, the contamination issues at March AFB are complex. As a result, the work has been organized into operable units.

Three Operable Units (OU1, OU2, and OU3) were created to facilitate the restoration process. Categorization of OUs was based primarily on geographical location and similarities in contaminant types and distribution. The location of OU1, OU2, and OU3 sites are shown in Figure 4-1.

OU1 encompassed Sites 4, 5, 7, 9, 10, 13, 14, 15, 16, 18, 29, 31, 34, and 38. Sites 21 and 23 were initially included in OU1, but Site 23 was transferred to OU2, and Site 21 will be addressed in another AFRPA decision document. OU1 also includes the off-base portion of the groundwater plume at the eastern Base boundary. A ROD was issued for OU1 in June of 1996 which addresses: 1) soil at Sites 10, 15, 18, 31 and 34; and 2) groundwater at Sites 4, 18 and 31 and the combined OU1 groundwater plume.

OU2 originally included Sites 1, 2, 3, 6, 8, 11, 12, 17, 19, 20, 22, 23, 24, 25, 26, 27, 28, 30, 32, 35, 36, 37, 39, 40, 41and 42. Sites 28 and 32 were originally listed in the FFA as OU2 sites. Site 28 was a network of monitoring wells (28MW1 through 28MW10) dispersed throughout the Main Base. Since Site 28 was not an identified source of contamination, a separate investigation for Site 28 was not required and this site will not be discussed further in this document. Site 32 was loosely described as areas of construction debris for which locations were not specified. Several specific construction debris sources were identified at some OU2 sites, such as Sites 17, 20, and 30. No other specific locations were identified for inclusion in the remedial investigation/feasibility study (RI/FS), and further investigation of Site 32 was not required.

An RI/FS was prepared for OU2 sites between 1992 and 1997. The main objectives of the OU2 RI were to collect additional data to confirm contaminant source areas, to delineate contaminant boundaries, to assess potential risks to human health and the environment, and to evaluate remedial alternatives for soil and groundwater cleanup. In February 1998, a draft ROD was issued for all of the OU2 sites to meet the FFA deadline. A draft final OU2 ROD was issued in November 1998.

Since issuance of the draft final OU2 ROD, the Air Force has separated the OU2 ROD into an AFRPA ROD and an AFRC ROD. This separation of the RODs is intended to expedite the transfer of AFRPA-controlled land to the community.

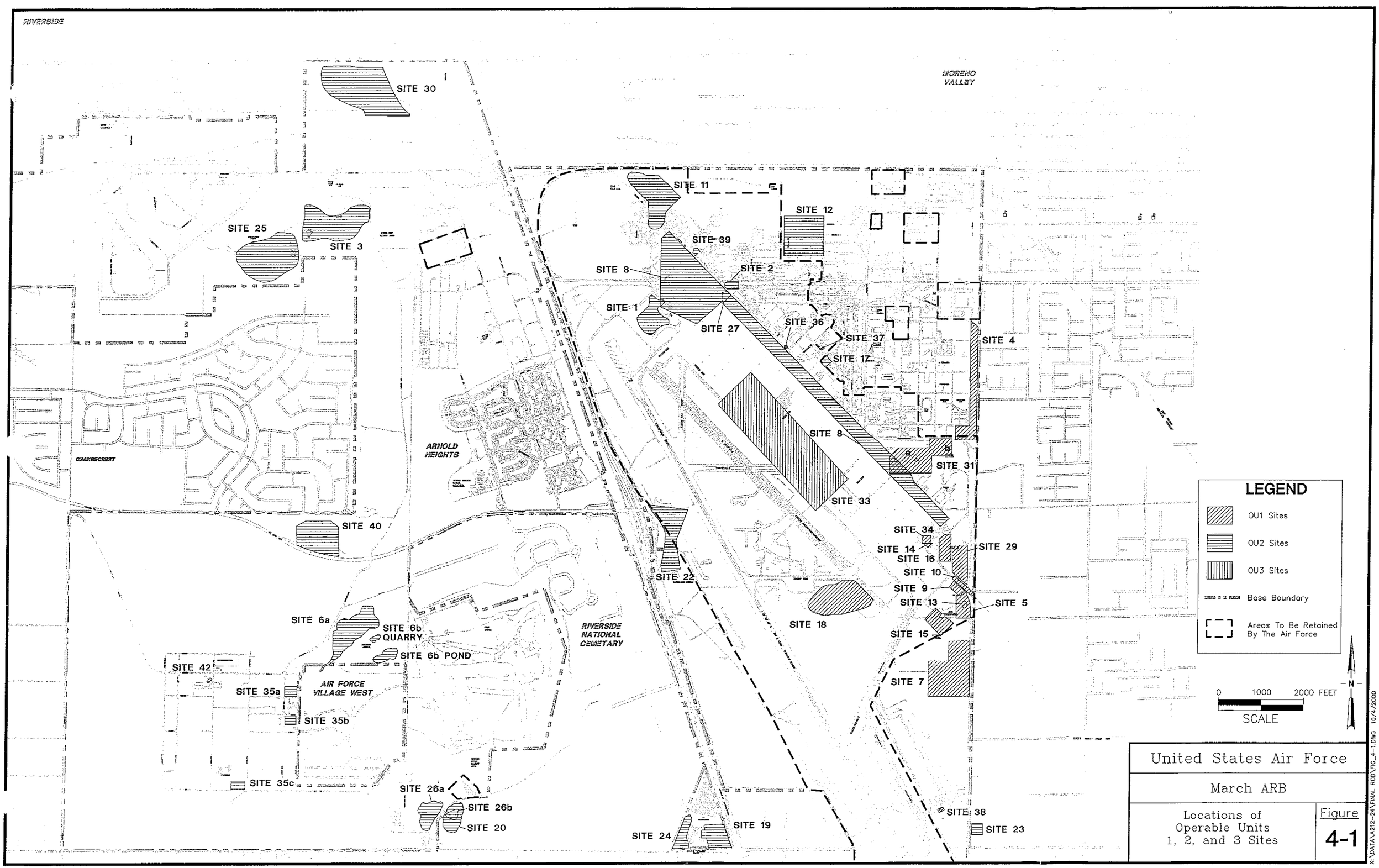
This AFRPA OU2 ROD addresses only the OU2 sites, primarily located on West March, managed by the AFRPA (Sites 3, 6, 12, 17, 19, 20, 26, 22, 23, 24, 25, 30, 35, 40, and 42 [Figure D-1]). The sites included in this document are in areas that have been declared excess property and will be transferred from Air Force control. The remaining OU2 sites are in the AFRC cantonment property. The sites in OU2 not addressed in this document will be described in a separate decision document or documents for the OU2 sites that are managed by the AFRC. A listing of the sites and the agency managing each site is provided in Table 4-1. A summary of the current status of the OU2 sites addressed in this document is included in Table 4-2.

OU3 consists of IRP Site 33 (Panero Aircraft Fueling System). Soil and groundwater in OU3 have been contaminated by jet fuel. A Decision Document was issued for OU3 in October of 1996, which addresses the soil and groundwater contamination. The Decision Document for OU3 was intended to upgrade the ongoing jet fuel removal and increase the removal rate

Sites 21, 41, 43 and 44, Site L, and Environmental Baseline Survey sites such as former transformer areas and a former power generator facility will be addressed in a future AFRPA decision document.

Sites 6c, 6d, and 6e were abandoned quarries located on Air Force Village West, south of Site 6b, reportedly filled with domestic solid waste, demolition debris, and, potentially, industrial wastes believed to be from March AFB activities. Site 6c was approximately 6 acres in size and Site 6d was approximately 8.7 acres in size. Wastes in Sites 6c and 6d were excavated and transported to the Site 6 engineered waste cell for disposal. The excavated materials included demolition debris, domestic wastes, and soils. Site 6c contained about 22,300 cubic yards of waste. Site 6d contained about 35 cubic yards of waste in a few small debris piles. Site 6e was reportedly about 2 acres in size and the area was developed into housing in the late 1980's. During development of Air Force Village West in approximately 1989 to 1991, the Site 6e quarry was backfilled. No information is available regarding the quantity or disposition of waste, if any, from Site 6e. (IT Corporation 1997a)

Confirmation soil samples were taken from the base of the excavations in Sites 6c and 6d Constituent concentrations, with the exception of arsenic and beryllium, were either below EPA Region IX residential PRGs or were not detected. Arsenic concentrations in most samples were at levels above residential PRGs, but were within the range of background arsenic levels for West March AFB. Concentrations of beryllium in some samples also exceeded the residential PRGs, but were within the range of background beryllium levels for West March AFB (IT Corporation 1997a)


RIVERSIDE
MORENO VALLEY
ARNOLD HEIGHTS
GRANGECREST
RIVERSIDE NATIONAL CEMETARY
AIR FORCE VILLAGE WEST
SITE 30
SITE 25
SITE 3
SITE 11
SITE 12
SITE 39
SITE 8
SITE 2
SITE 1
SITE 27
SITE 36
SITE 37
SITE 17
SITE 4
SITE 8
SITE 31
SITE 33
SITE 40
SITE 22
SITE 34
SITE 14
SITE 16
SITE 29
SITE 10
SITE 9
SITE 13
SITE 5
SITE 18
SITE 15
SITE 7
SITE 6a
SITE 6b QUARRY
SITE 6b POND
SITE 42
SITE 35a
SITE 35b
SITE 35c
SITE 26a
SITE 26b
SITE 20
SITE 24
SITE 19
SITE 38
SITE 23
LEGEND
OU1 Sites
OU2 Sites
OU3 Sites
Base Boundary
Areas To Be Retained By The Air Force
0 1000 2000 FEET
SCALE
N
United States Air Force
March ARB
Locations of Operable Units 1, 2, and 3 Sites
Figure 4-1
X:\DATA\A212-24\FINAL ROD\FIG_4-1.DWG 10/4/2000

## TABLE 4-1
## OU2 SITES

| Site No. | Description | Managing Agency |
|---|---|---|
| 1 | Aircraft Isolation Area | Air Force Reserve Command |
| 2 | Waste Oil Tanks/Solvent Pits | Air Force Reserve Command |
| 3 | Landfill No. 5 | Air Force Real Property Agency |
| 6 | Landfill No. 4 | Air Force Real Property Agency |
| 8 | Flightline Shop Zone | Air Force Reserve Command |
| 11 | Bulk Fuel Storage Area | Air Force Reserve Command |
| 12 | Civil Engineering Yard | Air Force Real Property Agency |
| 17 | Swimming Pool Fill | Air Force Real Property Agency |
| 19 | West March Sludge Drying Beds | Air Force Real Property Agency |
| 20 | Landfill No. 7 | Air Force Real Property Agency |
| 22 | Landfill No. 2 | Air Force Real Property Agency |
| 23 | East March Effluent Pond | Air Force Real Property Agency |
| 24 | Landfill No. 1 | Air Force Real Property Agency |
| 25 | Munitions Residue Burial Site | Air Force Real Property Agency |
| 26 | Water Treatment Sludge | Air Force Real Property Agency |
| 27 | Building 422 Underground POL Tanks | Air Force Reserve Command |
| 28[1] | Main Base Monitoring Well Network | Air Force Reserve Command |
| 30 | Construction Rubble Burial Site | Air Force Real Property Agency |
| 32 | Construction Debris Areas | Air Force Real Property Agency |
| 35 | 15th Air Force Headquarters Leaking Underground Storage Tanks | Air Force Real Property Agency |
| 36 | Building 458 Leach Pit | Air Force Reserve Command |
| 37 | PCB Spill at Building 317 | Air Force Reserve Command |
| 39 | Abandoned Gas Station | Air Force Reserve Command |
| 40 | Landfill No. 8 | Air Force Real Property Agency |
| 41 | Hawes Site | Air Force Real Property Agency [2] |
| 42 | Building 3404 Transformers | Air Force Real Property Agency |

Notes: [1] Investigated by potential source areas such as Site 2 and Site 8 Required remedial action for these sources is provided under the site containing the source.
[2] Site 41 will be discussed in a separate decision document

## TABLE 4-2
### SITE STATUS SUMMARY
### OU2 SITES MANAGED BY AFRPA

| Site No. | Interim Removal Action Performed | Institutional Controls Required |
|---|---|---|
| 3 | Yes | No, unrestricted land use |
| 6 | Yes | Yes (land use restrictions, SLUC[1] and groundwater monitoring) |
| 12 | Yes | Yes (groundwater monitoring and use restrictions[2]; land use restrictions and SLUC[1]) |
| 17 | Yes | Yes (land use restrictions and SLUC[1]) |
| 19 | No | Yes (land use restrictions and SLUC[1]) |
| 20 | Yes | No, unrestricted land use |
| 22 | No | No, unrestricted land use |
| 23 | No | No, unrestricted land use |
| 24 | Yes | No, unrestricted land use |
| 25 | Yes | No, unrestricted land use |
| 26 | Yes | No, unrestricted land use |
| 30 | No | No, unrestricted land use |
| 35 | Yes | No, unrestricted land use |
| 40 | Yes | No, unrestricted land use |
| 42 | Yes | No, unrestricted land use |

Notes: [1]State Land Use Covenant
[2]Until concentrations are below maximum contaminant levels

# DECISION SUMMARY:
# 5.0 - SUMMARY OF CHARACTERISTICS

# 5.0 SUMMARY OF SITE CHARACTERISTICS

## 5.1 SITE CHARACTERISTICS

The following section presents a brief overview of the site characteristics of each OU2 site located outside the cantonment area and controlled by AFRPA. Detailed information is presented in Section 3.0 of the OU2 RI/FS (Tetra Tech, Inc. 1997a).

### 5.1.1 Site 3 – Landfill No. 5.

Site 3 is a former 23-acre landfill located south of Cactus Avenue and west of Plummer Road (Figure 4-1). The physical site setting consists of thin alluvial cover over shallow granitic bedrock at varying depth. Outcrops of granitic rock surround the site. Two major, intermittent, surface drainage channels flow through the site. Both of these drainages originate west of the site and flow northeast. A potential jurisdictional wetland occupies a portion of the site in the drainages. Groundwater at Site 3 is present within the weathered granitic rock and in the alluvium. Groundwater flow is generally towards the northeast. Aquifer conditions are unconfined. The groundwater is found at about 15 to 25 feet bgs. Riparian vegetation is found in the drainage areas. Site 3 is located in the 1,300-acre Stephens' Kangaroo Rat (SKR) reserve.

The Site 3 landfill was used from 1954 through 1974. The landfill received household and dumpster waste, construction debris, and military waste from the Base. The military wastes included empty tanks, spent munitions, and miscellaneous wastes such as parachutes, medical waste, and fire hoses. Some of the contaminants found in the wastes included volatile organic compounds, pesticides, PCBs, PAHs, and munitions residues. The Air Force was concerned that the waste in the landfill might contaminate the soil and groundwater. After discussions with the regulatory agencies and the public, a decision was made to clean up the site by removing the landfilled waste.

An interim removal action was completed in late 1995 and early 1996 (IT Corporation 1997b). Approximately 223,200 cubic yards of landfilled materials and soil were removed. Excavated materials from Site 3 to be transported to and disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and monitored during the removal action according to approved work plans. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 3 placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. Materials not meeting the CCR Title 23, Section 2523 requirements were sent off base for disposal. Confirmation sampling conducted after the interim removal action confirmed that the site had been cleaned to levels protective of human health and the environment. No restrictions on land use are required. The results of the confirmation sampling are discussed in Section 6, Summary of Site Risks.

After the interim removal action, the site was restored by backfilling with clean soil and revegetating the site. In general, knolls and higher areas of excavation were covered with approximately 3 feet of soil and slopes adjacent to drainages were covered with 2 feet of soil. Low-lying drainages were covered with 6 inches of soil. The site was revegetated with a seed mix approved by the U.S. Fish and Wildlife Service. The 0.2 acres of wetland disturbed by the interim removal action were backfilled with 2 feet of soil and revegetated.

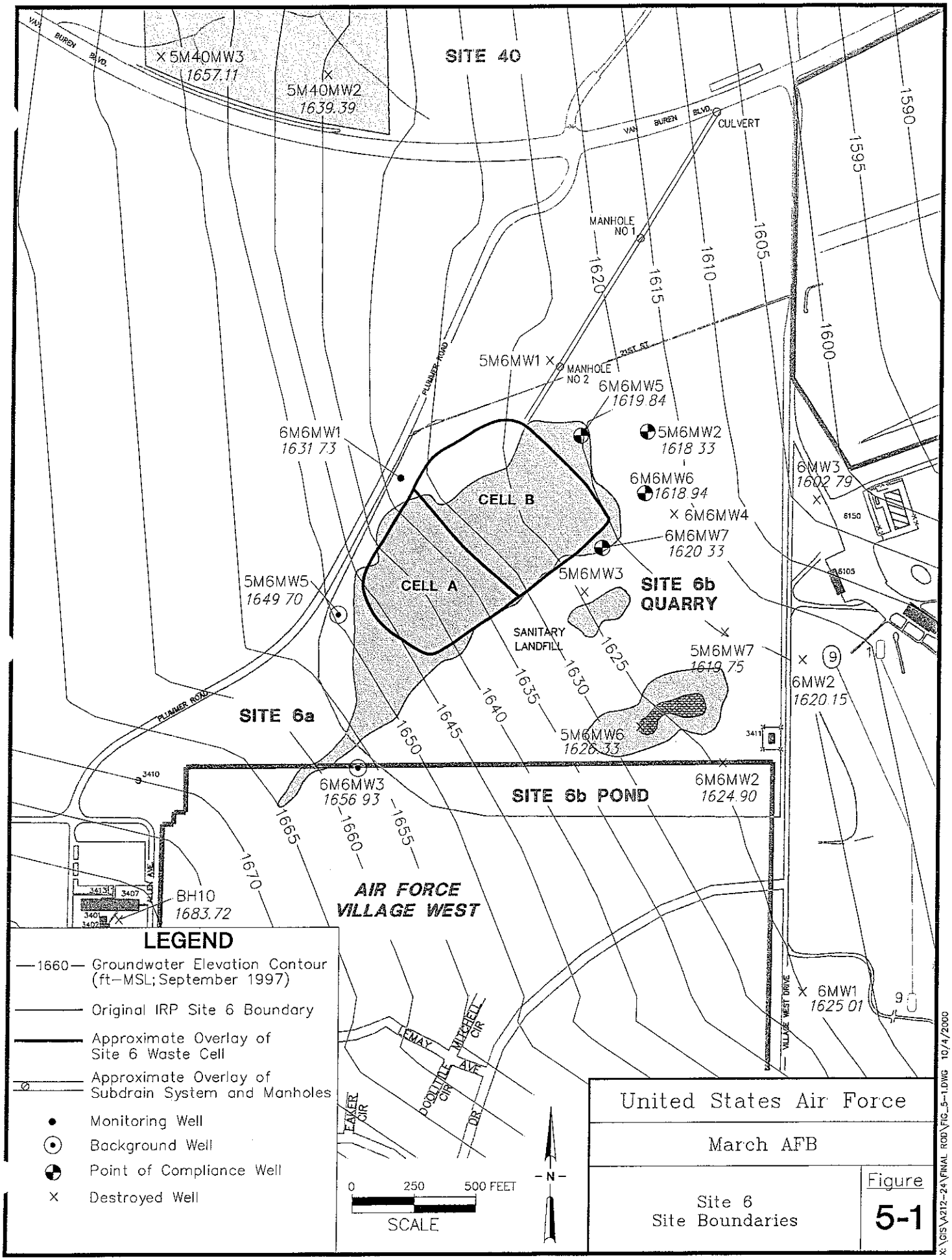
### 5.1.2 Site 6 – Landfill 4

Site 6 is located on West March, north of the Air Force Village West residential development, south of Van Buren Boulevard, east of Plummer Road, and west of Air Force Village West Drive (Figure 4-1 and Figure 5-1). The landfill comprised three discrete areas: Site 6a (approximately 15 acres) the location of the main former landfill area; Site 6b Quarry (approximately 0.6 acre) the location of a former quarry; and Site 6b Pond (approximately 2.6 acres) the location of a pond.

The topography at Site 6 consists of gently rolling hills incised by drainage gullies. Rock outcrops are scattered over the area and, where covered with alluvium, the depth to weathered granitic bedrock is relatively shallow. Groundwater at Site 6 is unconfined at depths ranging from approximately 10 to 38 feet bgs. Groundwater flows toward the east-northeast. Surface water at Site 6 generally drains toward the east-northeast through two natural drainage channels. Site 6b Pond contains standing water and is surrounded by riparian vegetation. The Site 6b Pond below elevation 1,629 feet mean sea level (MSL) is a jurisdictional wetland.

Site 6 was used by March AFB from the early 1950s to the early 1980s for disposal of household waste and construction debris. Polycnuclear aromatic hydrocarbons (PAHs), PCBs, pesticides, herbicides, and dioxins were found in samples of soil and water collected during the OU2 RI. An interim removal action was conducted in 1995; approximately 63,000 cubic yards of waste were removed from Site 6a and temporarily stockpiled (IT Corporation 1997c). Waste at Site 6a was removed from the vadose zone and beneath groundwater including soil contaminated with petroleum hydrocarbons. Waste was also removed from the pond, including debris and tar. Two engineered waste cells, over 12 acres in size, were constructed in the Site 6a area (Figure 5-1). No confirmation samples were taken of soils and bedrock under Site 6a because the bottom of the excavation was below the water table and sample results would not be meaningful. This site was treated as a closure in place rather than a clean closure. Stockpiled waste from Site 6a was landfilled back into the engineered waste cells over Site 6a. Excavated materials from Site 6a to be disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and monitored during the removal action according to approved work plans. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 6a placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill.

The engineered waste cells built at Site 6 meet federal and state environmental standards (IT Corporation 1995 and IT Corporation 1997c and d). Only non-hazardous waste, as defined in CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) from various sites, primarily Sites 1, 3, 6, 12, 20, 24, 25, 26, 40, and other sites was placed in the waste cells. The engineered waste cells at Site 6 contain: petroleum contaminated soil; domestic trash; lime sludge; construction debris; military wastes; as well as soil with PAHs, PCBs, dioxins, organochlorine pesticides; organophosphorus pesticides; lead; hexavalent chromium; cadmium, arsenic, antimony, munitions residues (RDX and nitroguanadine); and volatile and semivolatile organic compounds. The engineered waste cells have a volume of about 600,000 cubic yards. The soil cap placed over the engineered waste cells prevents potential receptor exposure to the waste. A liner, subdrain, and leachate collection systems installed beneath the landfill act as a barrier to protect the groundwater beneath the site. The site requires periodic inspections of the landfill cap and engineered structures to maintain the integrity of the engineered waste cells, as well as monitoring of groundwater.


SITE 40
5M40MW3
1657.11
5M40MW2
1639.39
VAN BUREN BLVD.
CULVERT
MANHOLE NO 1
MANHOLE NO 2
21ST ST.
PLUMMER ROAD
5M6MW1
6M6MW5
1619.84
6M6MW1
1631.73
5M6MW2
1618.33
6M6MW6
1618.94
6M6MW4
6M6MW7
1620.33
6MW3
1602.79
CELL B
CELL A
5M6MW5
1649.70
5M6MW3
SITE 6b
QUARRY
SANITARY
LANDFILL
5M6MW7
1619.75
6MW2
1620.15
SITE 6a
5M6MW6
1626.33
6M6MW3
1656.93
6M6MW2
1624.90
SITE 6b POND
AIR FORCE
VILLAGE WEST
BH10
1683.72
6MW1
1625.01
VILLAGE WEST DRIVE
LEMAY
MITCHELL CIR
AVE
DOOLITTLE CIR
DR
EAKER CIR
1590
1595
1600
1605
1610
1615
1620
1625
1630
1635
1640
1645
1650
1655
1660
1665
1670
LEGEND
1660 Groundwater Elevation Contour (ft-MSL; September 1997)
Original IRP Site 6 Boundary
Approximate Overlay of Site 6 Waste Cell
Approximate Overlay of Subdrain System and Manholes
Monitoring Well
Background Well
Point of Compliance Well
Destroyed Well
0 250 500 FEET
SCALE
N
United States Air Force
March AFB
Site 6
Site Boundaries
Figure
5-1
X:\GIS\A212-24\FINAL ROD\FIG_5-1.DWG 10/4/2000

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Landfilled debris associated with Site 6b Pond and Site 6b Quarry, approximately 19,300 cubic yards of debris and soil, was removed and deposited in the Site 6 engineered waste cells (IT Corporation 1997d). Approximately 2,480 tons of soil or sediment impacted by oil and tar and 4,770 tons of waste were removed from the sites and disposed of off the Base. Excavated materials from Site 6b to be disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and monitored during the removal action according to approved work plans.

According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 6b placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. Confirmation samples of the soil and bedrock were taken. The results confirmed that Site 6b Pond and Site 6b Quarry had been cleaned to levels protective of human health and the environment. No restriction on future use of the land is required. The results of the confirmation sampling are discussed in Section 6, Summary of Site Risks.

After the interim removal action, Site 6b was restored by regrading with alluvium and decomposed granite and revegetating the site. Excavation slopes were graded to a 2 to 1 ratio with a bench midway up the slope. Hydroseeding was performed and erosion mats were laid for slope protection. In the Site 6b Pond area, the existing wetland was expanded to 0.75 acres and the area was revegetated with wetland trees and plants per an approved restoration plan (IT Corporation 1997a).

### 5.1.3 Site 12 – Civil Engineering Yard.

Site 12, the 20-acre Base Civil Engineering Yard, is located north of MacDill Street, between Lackland Avenue and Travis Avenue (Figure 4-1 and Figure 5-2). The area is developed with numerous structures and is partially paved with asphalt. Bedrock was not encountered during investigations at Site 12. The ground surface at Site 12 is generally flat, sloping gently toward the south. Surface drainage within the paved area is collected by a system of drain inlets and pipes that drain to the south. The depth to groundwater is approximately 40 feet and has risen over 10 feet since 1993. The direction of groundwater flow is to the west and southwest.

From the 1950's to 1996, Site 12 was the civil engineering yard for general maintenance operations for March AFB (Figure 5-2). It included a carpentry shop, electrical shop, paint shop, pesticide shop, and storage areas for heavy equipment. These shops used and stored a variety of hazardous materials including paints and paint-related products, pesticides, solvents, acids, and drums labeled hazardous waste.

During the OU2 RI, PAHs and hexavalent chromium were found in soil samples. The contaminant 1,1-dichloroethene (1,1-DCE) was found in soil vapor samples in a small area in deeper soils near Building 2507 (Figure 5-2). Groundwater beneath Site 12 has become impacted by trichloroethene (TCE) and tetrachloroethene (PCE). The groundwater contamination is in a small area and is only slightly above maximum contaminant levels (MCLs). Periodic monitoring of the groundwater to observe changes in contaminant concentrations is being conducted.

After discussions with the regulatory agencies and the public, a limited interim removal action was taken in 1996 to ensure that the site could be used for industrial purposes by removing soils contaminated with PAHs and hexavalent chromium at the northwest portion of Site 12 (IT Corporation 1997e). Approximately 2,000 cubic yards (erroneously reported as 3,000 cubic yards in the 2000 Proposed Plan) of non-hazardous contaminated soil was excavated from a small area in the northwest portion of the site and placed in the engineered waste cells at Site 6. Excavated materials from Site 12 to be transported to and disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and prior to excavation activities for the removal action according to approved work plans. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 12 placed in the Site 6 engineered waste cells met the requirements of

CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. The excavations were backfilled with clean soil. Soil contaminated with petroleum hydrocarbons was not removed from areas under a drum storage area and beneath the asphalt paving near a removed washbasin (Figure 5-2). Confirmation soil samples were collected from the base of the excavations and the excavation sidewalls under the drum storage area and asphalt paving after the interim removal action. The results of the confirmation sampling confirmed that an industrial land use is appropriate. The results of confirmation sampling demonstrate that industrial PRGs were met. The results are discussed in Section 6, Summary of Site Risks.

### 5.1.4 Site 17 – Swimming Pool Fill.

Site 17 is a former Base swimming pool located on the Main Base on U Street between DeKay and K Streets (Figure 4-1 and Figure 5-3). The area is vacant land, adjoining Base housing to the east and south. Bedrock was not encountered during investigations at Site 17. The ground surface at Site 17 is generally flat. The depth to groundwater is approximately 45 to 50 feet and has risen since 1993. The direction of groundwater flow is to the south.

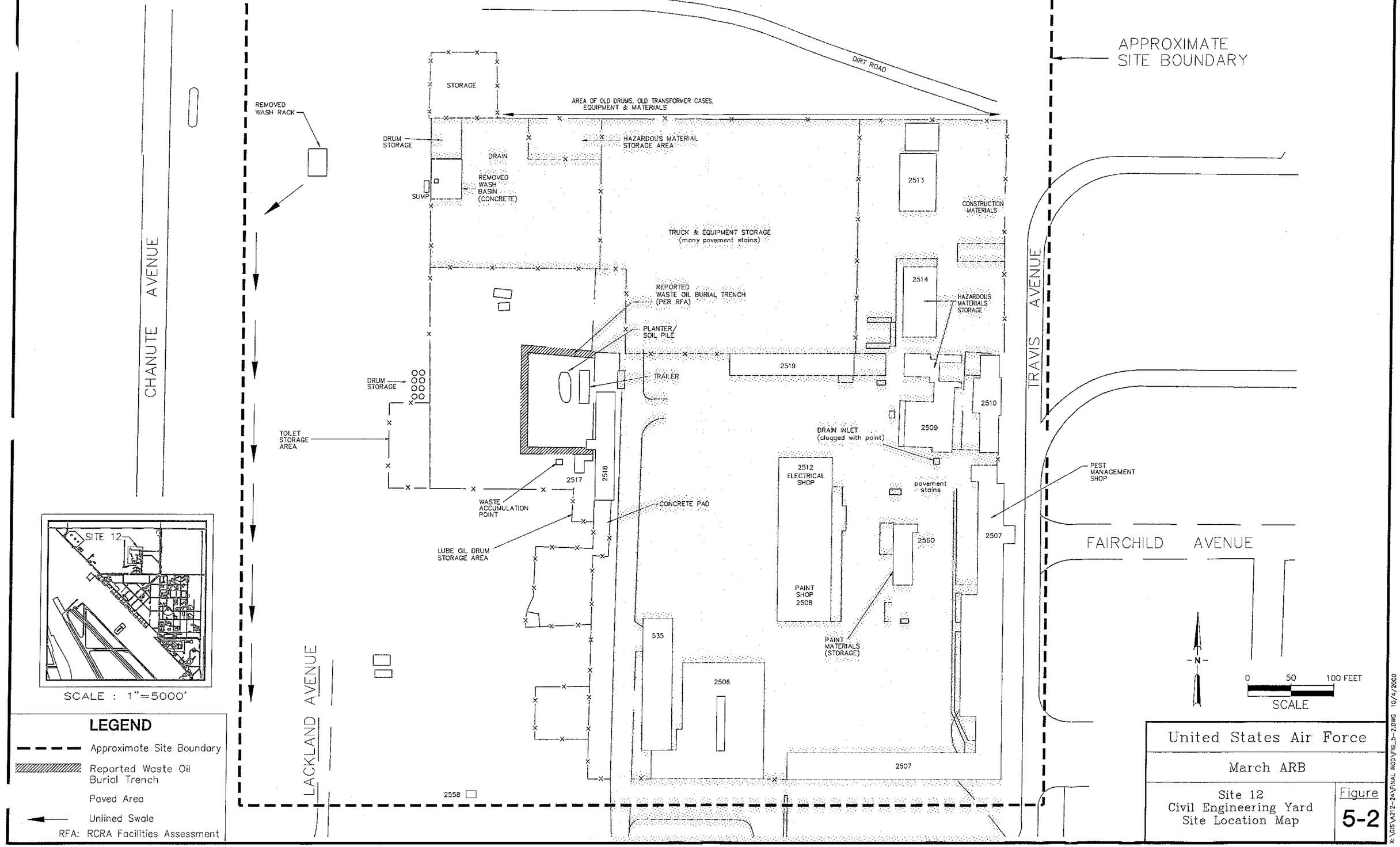
The former swimming pool at Site 17 was closed in the 1970s. After it was closed, the pool was used as a disposal site and the wastes were covered with soil. After discussions with the regulatory agencies and the public, a decision was made to clean the site by removing the waste. The pool and its contents were removed during a 1994 interim removal action (Tetra Tech, Inc 1994). The wastes were taken off the Base for disposal. After the interim removal action, low levels of PCBs were still detected in soils at least 8 feet beneath the ground surface. The pool excavation was filled with clean soil, leaving the PCBs in place. No PCB contamination has been found in the groundwater and the PCBs are not expected to migrate to groundwater. Confirmation sampling conducted after the interim removal action demonstrated that PCBs remain at the site at levels of concern to human health (Tetra Tech, Inc. 1994 and 1997a). The results of confirmation sampling are further discussed in Section 6, Summary of Site Risks.

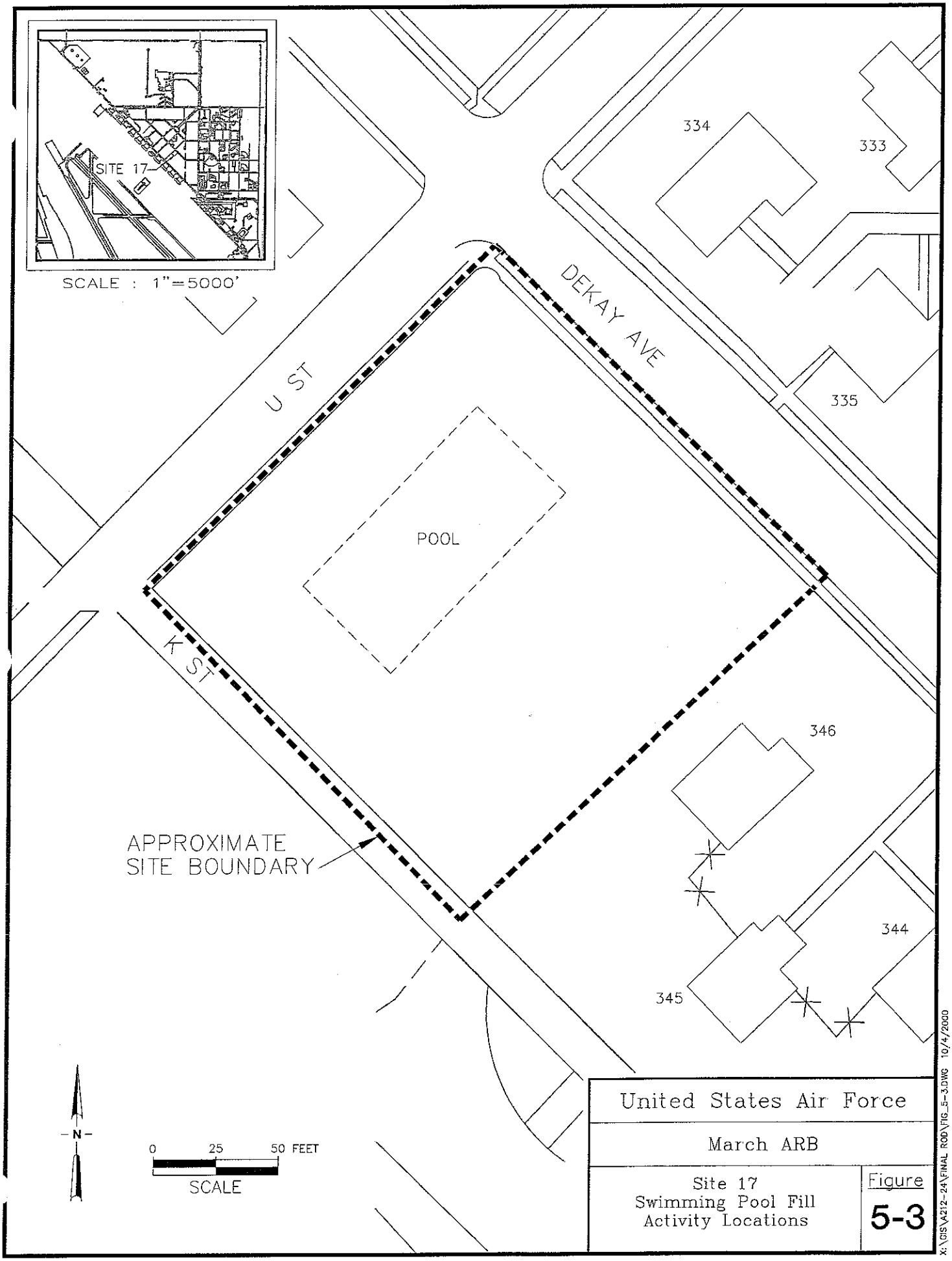
### 5.1.5 Site 19 – West March Sludge Drying Beds.

Site 19 is about 7 acres in size, located at the southern end of West March (Figure 4-1 and Figure 5-4), east of the active wastewater treatment plant. The site is generally vacant land with four concrete lined drying beds in the western portion of the site. Bedrock was not encountered during investigations at the site. The topography of the site is flat with a gentle slope to the east. Surface water drains toward the east into an unlined channel. Groundwater beneath Site 19 is in unconfined conditions at a depth of about 15 feet. Water levels show significant seasonal fluctuations, with higher levels measured during and after wet seasons. Groundwater flow direction is primarily to the east.

Site 19 contains the four active lined sludge-drying beds and three inactive, unlined sludge-drying beds associated with the wastewater treatment plant (Figure 4-1 and Figure 5-4). The plant was constructed in 1941 and used to process the wastewater from Camp Haan and March AFB. A total of 10 sludge-drying beds have historically been used at the site. Three of these beds have been backfilled. In 1990 when the plant was upgraded, four lined drying beds were constructed at the location of previously unlined beds.

In the past, wastewater treatment sludge was spread out in the unlined drying beds to dry. When dry, the sludge was removed from the drying beds. Recently, the dried sludge has been removed from the Base for disposal. Past disposal practices are unknown. PAHs, PCBs, hexavalent chromium, and thallium were found in soil samples in the area of the unlined sludge beds at levels above residential PRGs. The sampling results for Site 19 are discussed in Section 6, Summary of Site Risks.


CHANUTE AVENUE
APPROXIMATE SITE BOUNDARY
DIRT ROAD
STORAGE
AREA OF OLD DRUMS, OLD TRANSFORMER CASES, EQUIPMENT & MATERIALS
REMOVED WASH RACK
DRUM STORAGE
HAZARDOUS MATERIAL STORAGE AREA
DRAIN
SUMP
REMOVED WASH BASIN (CONCRETE)
2513
CONSTRUCTION MATERIALS
TRUCK & EQUIPMENT STORAGE (many pavement stains)
2514
REPORTED WASTE OIL BURIAL TRENCH (PER RFA)
HAZARDOUS MATERIALS STORAGE
PLANTER/ SOIL PILE
2519
TRAILER
DRUM STORAGE
2510
2509
DRAIN INLET (clogged with paint)
TOILET STORAGE AREA
2512 ELECTRICAL SHOP
PEST MANAGEMENT SHOP
2517
2518
WASTE ACCUMULATION POINT
CONCRETE PAD
pavement stains
2560
2507
FAIRCHILD AVENUE
LUBE OIL DRUM STORAGE AREA
PAINT SHOP 2508
PAINT MATERIALS (STORAGE)
535
2506
LACKLAND AVENUE
2558
2507
TRAVIS AVENUE
SITE 12
SCALE : 1"=5000'
LEGEND
Approximate Site Boundary
Reported Waste Oil Burial Trench
Paved Area
Unlined Swale
RFA: RCRA Facilities Assessment
N
0 50 100 FEET
SCALE
United States Air Force
March ARB
Site 12
Civil Engineering Yard
Site Location Map
Figure
5-2
X:\GIS\A212-24\FINAL ROD\FIG_5-2.DWG 10/4/2000


SITE 17
SCALE : 1"=5000'
334
333
335
DEKAY AVE
U ST
K ST
POOL
346
344
345
APPROXIMATE
SITE BOUNDARY
N
0
25
50 FEET
SCALE
United States Air Force
March ARB
Site 17
Swimming Pool Fill
Activity Locations
Figure
5-3
X:\GIS\A212-24\FINAL ROD\FIG_5-3.DWG 10/4/2000

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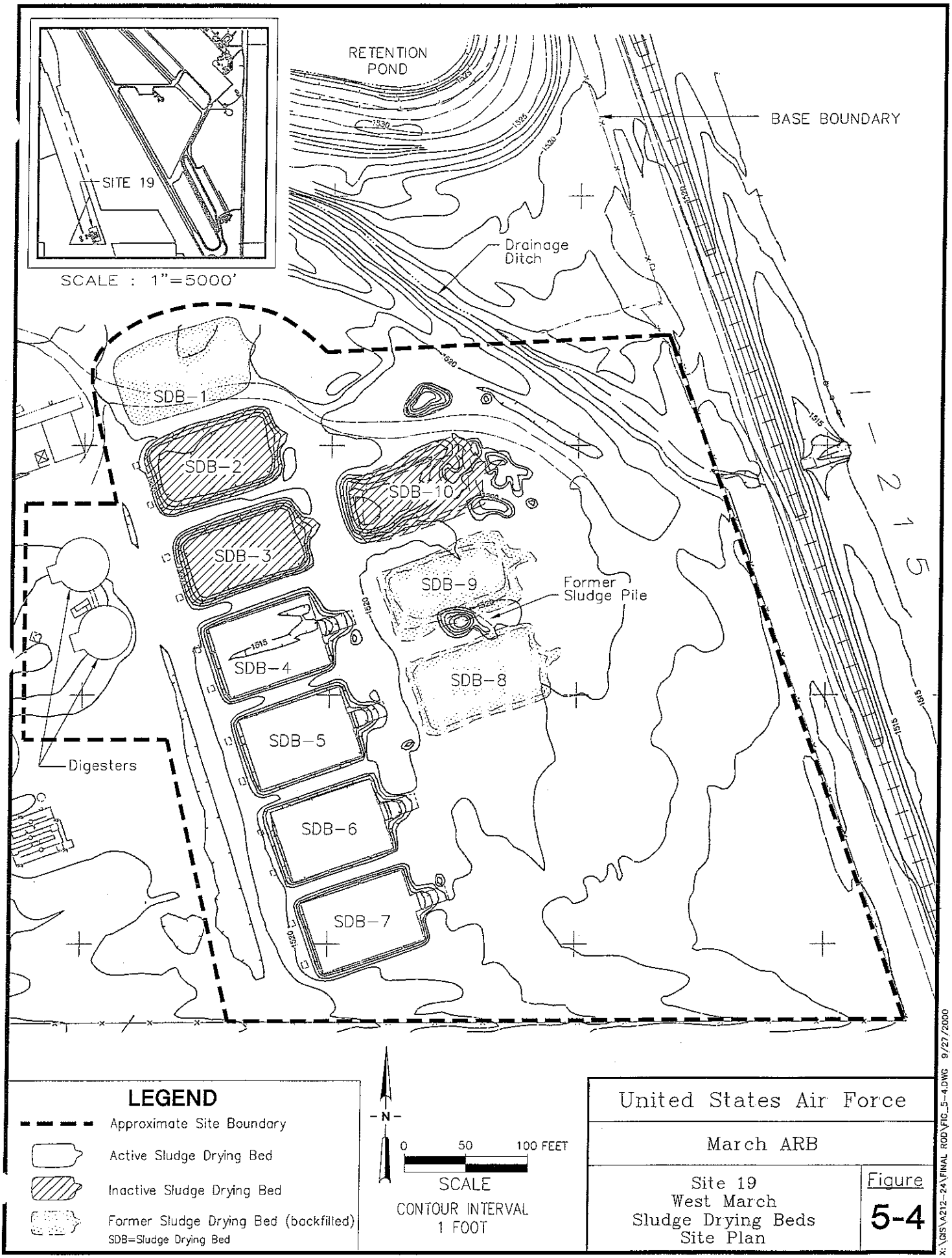
SITE 19
SCALE : 1"=5000'
RETENTION POND
BASE BOUNDARY
Drainage Ditch
SDB-1
SDB-2
SDB-10
SDB-3
SDB-9
Former Sludge Pile
SDB-4
SDB-8
SDB-5
Digesters
SDB-6
SDB-7
I-215
LEGEND
Approximate Site Boundary
Active Sludge Drying Bed
Inactive Sludge Drying Bed
Former Sludge Drying Bed (backfilled)
SDB=Sludge Drying Bed
-N-
0 50 100 FEET
SCALE
CONTOUR INTERVAL
1 FOOT
United States Air Force
March ARB
Site 19
West March
Sludge Drying Beds
Site Plan
Figure
5-4
X:\GIS\A212-24\FINAL ROD\FIC_5-4.DWG 9/27/2000

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### 5.1.6 Site 20 – Landfill No. 7.

Site 20 is located adjacent to the southwest portion of March AFB, on the property acquired by the Department of Veterans Affairs from the Air Force in the 1970s (Figure 4-1). The topography at Site 20 consists of gently rolling hills incised by drainage gullies. Rock outcrops are scattered over the area and, where covered with alluvium, the depth to weathered granitic bedrock is relatively shallow. Groundwater at Site 20 is in unconfined conditions at depths ranging from approximately 12 to 43 feet bgs. Groundwater flows toward the northeast. Surface water drains to a prominent east-west ravine south of the landfill, which drains to the east.

Site 20 is a former landfill about 7 acres in size used between 1958 and 1965 as a disposal site for household waste and construction debris. Some of the chemicals found in the soils at Site 20 included PAHs, dieldrin, PCBs, and 1,4-dichlorobenzene. The Air Force was concerned the waste in the landfill could contaminate soil and groundwater. After discussions with the regulatory agencies and the public, a decision was made to clean up the site by removing the landfilled waste. The interim removal action at Site 20 was conducted in conjunction with the removal of dried sludge at Site 26a and 26b. Dried sludge of Site 26b covered a portion of Site 20.

Approximately 116,000 cubic yards of non-hazardous soil, debris, and dried sludge were removed from Sites 20 and 26 in 1996 and placed in the engineered waste cells at Site 6 (IT Corporation 1997f). Excavated materials from Site 20 to be transported to and disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and monitored during the removal action according to approved work plans. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 20 placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. After the waste was removed from Site 20, confirmation samples from beneath the former landfill were tested. The results confirmed that the site had been cleaned to levels protective of human health and the environment. No restriction on future use of the land is required. The results of the confirmation sampling are further discussed in Section 6, Summary of Site Risks.

After the interim removal action, Sites 20 and 26b were restored by grading the sites and reseeding with a seed mix approved by the U.S. Fish and Wildlife Service.

### 5.1.7 Site 22 – Landfill No. 2.

Site 22 is a suspected former landfill east of and adjacent to Interstate 215 (Figure 4-1). The site occupies essentially flat terrain. The general surface water drainage in the area is to the southeast following the gently sloping terrain. Bedrock was not encountered during investigations at Site 22. Groundwater at Site 22 is unconfined at a depth of about 25 feet bgs and the depth to groundwater has decreased since 1993.

The original 7-acre area of Site 22 was expanded to 15 acres by extending the northern site boundary to ensure all potential areas of concern were investigated. The location of the landfill was based on limited evidence. Investigations could not locate any landfilled materials or debris. Geophysical surveys were used to find buried metal or disturbed soils. Soil gas sampling was also conducted at this site. Finally, soil and groundwater were sampled. No contaminants were found in any of the samples and the geophysical surveys found no buried waste. This evidence showed that a landfill did not exist in this area. This site was investigated during the OU2 remedial investigation and levels of contamination requiring remedial action were not identified. There was no risk assessment completed on Site 22 because no contaminants were found and the site poses no risk to human health or the environment. No restriction on future use of the land is required.

### 5.1.8 Site 23 – East March Effluent Pond

Site 23 is located off-Base to the east, near the intersection of Nandina Avenue and Heacock Street in the City of Moreno Valley (Figure 4-1). The site occupies essentially flat terrain. The general surface water drainage in the area is to the southeast following the gently sloping terrain. Bedrock was not encountered during investigations at Site 23. Groundwater at Site 23 is at a depth of over 90 feet bgs and flows to the southeast.

Between 1938 and 1977, Site 23 was a 1-acre holding pond for wastewater that had been treated and used for irrigation of agricultural crops. In 1991, the pond was filled in, and it and the surrounding areas were leveled. The land is now used as a commercial sod farm and irrigated with reclaimed water from the Moreno Valley wastewater treatment plant. This site was investigated during the OU1 remedial investigation and no contamination requiring remedial action was identified. There was no risk assessment completed on Site 23 because no contaminants were found and the site poses no risk to human health or the environment. No restriction on future use of the land is required.

### 5.1.9 Site 24 – Landfill No. 1

Site 24 is a former 3-acre landfill, west of Site 19 (Figure 4-1). The topography of the site is generally flat with a ridge to the west of the site. Bedrock was not encountered during drilling or trenching at Site 24, but is expected to be shallow because bedrock is exposed to the west of the site. Surface water flows to a wash along the western portion of the site that directs runoff water to an eastward-trending channel north of the wastewater treatment plant. Groundwater is at a depth of about 20 to 30 feet. Groundwater flows towards the east and southeast.

Site 24 was reportedly used between 1941 and 1965 to dispose of household waste and military waste. A small amount of soil from bullet backstop berms may have been placed in the landfill as well as some ash from an incinerator. Some of the contaminants found in the waste included PAHs, PCBs, antimony, barium, and cadmium.

The Air Force was concerned that the waste in the landfill could contaminate groundwater. After discussions with the regulatory agencies and the public, a decision was made to clean up the site by removing the landfilled waste. In December 1996, approximately 19,300 cubic yards of non-hazardous, landfilled waste was removed and placed in the engineered waste cells at Site 6 (IT Corporation 1997g). Excavated materials from Site 24 to be transported to and disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and monitored during the removal action according to approved work plans. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 24 placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. Confirmation sampling conducted after the interim removal action confirmed that the site had been cleaned to levels protective of human health and the environment. No restriction on future use of the land is required. The results of the confirmation sampling are further discussed in Section 6, Summary of Site Risks.

After the interim removal action, the site was restored by backfilling with clean soil and revegetating the site. Site 24 was backfilled to grade and the soil contoured to drain as before the interim removal action. The site was revegetated with a seed mix approved by the U.S. Fish and Wildlife Service.

### 5.1.10 Site 25 – Munitions Residue Burial Site.

Site 25 covers approximately 33 acres and is located south of Cactus Avenue (Figure 4-1). The physical site setting consists of thin alluvial cover over shallow granitic bedrock at varying depth. Outcrops of granitic rock are west and north of the site. One major intermittent surface drainage in the southern portion of the site channels flows through the site. Groundwater at Site 25 is present within the weathered granitic rock and in the alluvium at 15 to 45 feet below ground surface. Groundwater at Site 25 flows toward the east.

Site 25 was used in the past for open air detonation and burning of munitions. Three areas with shallow trenches were used to bury munitions residue after destruction. Some of the contaminants found in the soils at this site included nickel, 1,3,5-trinitrobenzene, nitroglycerin, benzo(a)pyrene, and RDX, all of which are munition residues. Additionally, 1,1-dichloroethene was also found. The Air Force was concerned that the contaminants in soil would cause groundwater contamination. After discussions with the regulatory agencies and the public, a decision was made to clean up the site by removing the debris and contaminated soils. Approximately 3,000 cubic yards of non-hazardous waste from the trenches and contaminated soils were removed and disposed of in the engineered waste cells at Site 6 (IT Corporation 1997h). Excavated materials from Site 25 to be transported to and disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents at a rate of about 1 sample for every 200 cubic yards of excavated materials during the removal action. Testing was also performed as part of the remedial investigation. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 25 placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. Focused groundwater monitoring was completed at the site and no contaminants of concern were detected in groundwater. Confirmation sampling conducted after the interim removal action confirmed that the site had been cleaned to levels protective of human health and the environment. No restriction on future use of the land is required. The results of the confirmation sampling are further discussed in Section 6, Summary of Site Risks.

After the interim removal action, the site was restored by backfilling with clean soil and revegetating the site. Alluvial material from the areas surrounding the trenches was used to bring the excavations back to original grade. The site was revegetated with a seed mix approved by the U.S. Fish and Wildlife Service.

### 5.1.11 Site 26 – Water Treatment Sludge.

Site 26 covers approximately 3 acres and is located in the southwest portion of March AFB (Figure 4-1). Site 26 is subdivided into two areas, Site 26a and 26b. Site 26b is located over a portion of the Site 20 landfill. Site 26a is located on property controlled by the AFRPA and Site 26b is on the property of the Department of Veterans Affairs. The topography at Site 26 consists of gently rolling hills incised by drainage gullies. Rock outcrops are scattered over the area and, where covered with alluvium, the depth to weathered granitic bedrock is relatively shallow. Groundwater at Site 26 is unconfined at depths ranging from approximately 17 to 39 feet bgs. Groundwater flows toward the northeast. Surface water drains to a prominent east-west ravine, which drains to the east.

Site 26 was used for disposal of lime sludge that was a waste from the treatment of drinking water for March AFB. From 1941 to 1984, the water treatment plant treated Colorado River water used to supplement the drinking water supply for the Base. Arsenic from the treated Colorado River water was found in the lime sludge at low levels. After discussions with the regulatory agencies and the public, a decision was made to clean up the site by removing the sludge. As mentioned in the description of the landfill at Site 20, approximately 116,000 cubic yards of non-hazardous soil and dried sludge were removed from Sites 20 and 26 in 1996 and disposed of in the engineered waste cells at Site 6 (IT Corporation 1996, 1997f and 1997i). Excavated materials from Site 26 to be transported to and

disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents during the remedial investigation and monitored during the removal action according to approved work plans. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 26 placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous waste landfill. The area was then backfilled with clean soil and reseeded. No confirmation samples were collected at Site 26a because all visible wastes were removed to bedrock. Wastes of the Site 20 landfill were located under Site 26b and confirmation sampling was conducted as part of the interim removal action at Site 20. The results of these confirmation samples will be discussed in Section 6, Summary of Site Risks under the discussion for Site 20. The site contaminants have been totally removed. Thus, current site conditions are protective of human health and the environment. No restriction on future use of the land is required.

### 5.1.12 Site 30 – Construction Rubble Burial Site.

Site 30 covered approximately 40 acres, south of Alessandro Boulevard and west of Interstate 215. The physical site setting consists of thin alluvial cover over shallow granitic bedrock at varying depth. Exposed bedrock is west of the site. The general site topography slopes toward the northeast. Site 30 contains a pond that collects surface drainage from the surrounding area and is normally, though not continuously, filled with water. The pit may be fed by groundwater in certain seasons of the year and is heavily vegetated. The pond is a potential jurisdictional wetland. Groundwater elevations vary seasonally, but are generally within 20 feet of ground surface, with the highest groundwater levels recorded in early Spring. The groundwater flow direction is to the northeast. Weathered bedrock appears to support a discontinuous water table in the north and central portion of the site. Site 30 is located in the 1,300 acre SKR reserve.

There is no evidence that Site 30 ever operated as a March AFB-controlled landfill, but illegal dumping of domestic waste from the surrounding community has occurred and some minor amounts of construction debris were found. Soil and groundwater samples taken at the site did not detect contaminants at levels not protective of human health. After discussions with the regulators and the public, a decision was made to clean up the site by removing the domestic and construction debris. Domestic and construction debris was removed from the site in April 1997 and disposed of off the Base (OHM Remediation Services Corporation 1996). The Air Force has installed gates on access roads to prevent vehicular traffic to the site. Warning signs were placed in several areas, and gates remain padlocked to help prevent access by unauthorized persons.

The site conditions are protective of human health and the environment. No restriction on future use of the land is required. The results of sampling are discussed in Section 6, Summary of Site Risks.

### 5.1.13 Site 35 – 15th Air Force Headquarters Leaking Underground Storage Tanks.

Site 35 consisted of three subareas (Sites 35a, 35b, and 35c) located in the former 15th Air Force Headquarter complex on West March (Figure 4-1). The subareas were locations of former underground storage tanks (USTs) associated with Buildings 3409 (Site 35a), 3417/3418 (Site 35b), and 3406 (Site 35c). Bedrock was not encountered at any of the Site 35 subareas during investigations. These sites are generally flat with a general slope to the southeast and east. Runoff of surface water is to the southeast. Groundwater occurs beneath the sites at depths ranging from approximately 5 to 20 feet. The groundwater levels fluctuate with water levels dropping steadily after Spring highs, apparently caused by rainfall. Based on available data, groundwater flows to the east or northeast at Sites 35a and 35b and to the south or west at Site 35c.

The tanks at these locations were of various sizes and contained either fuel oil or diesel. Site 35a, a former 8,000-gallon fuel oil tank, was located west of Allen Avenue and south of 11th Street, east of Building 3409. Site 35b, two former diesel tanks of 6,650-gallon and 3,500-gallon, was located between Building 3417 and 3418, west of Allen Avenue and Bundy Avenue. Site 35c, a former 1,000-gallon diesel tank, was located north of 5th Street and west of Dalla Avenue, east of Building 3406. All tanks have been removed and the locations closed without restrictions in accordance with state and county regulations.

Fuel leaks have been associated with the tanks at Site 35. Sites 35a and 35b were investigated during the OU2 remedial investigation and other studies and levels of contamination requiring remedial action were not identified. After discussions with the regulatory agencies, the Air Force decided to clean up the soil by bioventing at Site 35c where fuel had leaked. Bioventing has reduced diesel fuel contamination to levels protective of human health and the environment at Site 35c (Parsons Engineering-Science 1997). No restriction on future use of the land is required. The results of sampling are discussed in Section 6, Summary of Site Risks.

There is no threat to groundwater at any of the Site 35 subareas.

### 5.1.14 Site 40 – Landfill No. 8.

Site 40 covers approximately 49 acres on West March, north of Van Buren Boulevard and west of Plummer Road (Figure 4-1). The most prominent feature at the site is the abandoned quarry, containing a pond with riparian vegetation. The pond is replenished by groundwater and by surface flow from an intermittent stream channel entering the pond from the west. The surface water drains from a housing area to the west of the site, flows through the pond, and then exits the site to the east. The pond is a potential jurisdictional wetland. Outcrops of granitic bedrock occur in several areas of the site. Bedrock is generally shallow with a thin mantle of soil. Groundwater at the site is generally within 10 to 40 feet of ground surface with minor seasonal fluctuations. The groundwater flow direction is to the east. Site 40 is located in the 1,300 acre SKR reserve.

Site 40 was used as a disposal location for drums, construction debris, battery casings, and motor vehicle parts. After discussions with the regulatory agencies, a decision was made to complete an expedited cleanup of the area exposed by the erosion and other debris at the site. The time-critical removal action completed in 1994 included removal of the drums, miscellaneous waste, and contaminated soil. Hazardous waste from the site was taken off the Base for proper disposal (OHM Remediation Services Corporation 1995). Approximately 6,800 cubic yards of non-hazardous materials were disposed of at the Site 6 engineered waste cells. Excavated materials from Site 40 to be transported to and disposed of in the engineered waste cells at Site 6 were tested for organic and inorganic constituents at a rate of about one sample for every 100 cubic yards of excavated materials during the removal action. Testing was also performed as part of the remedial investigation. According to the As-Built Construction Report OU2, Site 6a (IT Corporation 1997c), all materials from Site 40 placed in the Site 6 engineered waste cells met the requirements of CCR Title 23, Section 2523 (currently CCR Title 27, Section 20220) for a non-hazardous solid waste landfill. Following this time-critical removal action, confirmation sampling results confirmed that the site has been cleaned to levels protective of human health and the environment. The results of the confirmation sampling are discussed in Section 6, Summary of Site Risks As part of the removal action, the upgradient channel was lined and a concrete weir was installed at the pond outfall to prevent erosion. The weir raised the permanent water level in the pond about 1.5 feet as recommended by the California Fish and Game, expanding the wetlands. The excavations were backfilled with clean soil and reseeded (OHM 1995).

During a recent site visit and evaluation of available data for OU2 sites, levels of mercury were identified in sediments of a pond located at Site 40 that may present a threat to ecological receptors. The EPA and AFRPA have researched the current site conditions and potential corrective actions and determined that any actions taken to prevent exposure to mercury in sediments would be more disruptive to the wetland habitat at Site 40 than leaving the sediments in place. The efficacy of leaving these sediments in place will be reviewed during the first CERCLA 5-year review, and subsequent reviews as appropriate

Groundwater testing has shown there is no contamination of groundwater (AFRPA 2000).

### 5.1.15 Site 42 – Building 3404 Transformers.

Building 3404 is located on less than one acre near the intersections of 11th Street and Davis Avenue on West March (Figure 4-1). The surface topography is flat with limited surface water flow No bedrock was encountered during investigations on the site. Groundwater occurs beneath the site at depths of about 20 feet. Groundwater flow at the site is to the south.

Transformers located in Building 3404 reportedly leaked oils containing PCBs onto the floor of the transformer room. These oils were also spilled onto the soil surrounding the building. After discussions with the regulatory agencies and the public, a decision was made to clean up the area outside of Building 3404 by removing the contaminated soil In the interim removal action, the contaminated soils were excavated and taken offsite for proper disposal. A total of 330 tons of contaminated soils were removed from the site. The PCB concentrations were low enough to allow disposal of 292 tons of contaminated soils as non-hazardous waste. An additional 38 tons was disposed of off the Base as hazardous waste. Clean fill was placed in the excavation to grade and a gravel cover was placed on top of the previously excavated area. Confirmation sampling conducted after the interim removal action confirmed that the site had been cleaned to levels protective of human health and the environment (The Earth Technology Corporation 2000). No restriction on future use of the land is required. The results of the confirmation samples are discussed in Section 6, Summary of Site Risks.

Transformer oils may be present in the concrete floor of Building 3404. The Air Force attempted to remove the PCBs from the concrete. Minimal levels of PCBs were left and have been encapsulated. The concrete is not addressed in this AFRPA OU2 ROD because building interiors are not regulated under CERCLA. The current landowner, the County of Riverside, has entered into a land use covenant with the State that restricts use of the building to industrial activities and contains other measures to prevent exposure to residual contamination.

## 5.2 PROPOSED LAND USE FOR OU2 SITES CONTROLLED BY AFRPA

The current land use and adjacent land use for most of the OU2 AFRPA sites is vacant land/open space with limited commercial and residential land use adjacent to some of the sites as discussed below (Figure 5-5). Site 3 and the adjacent areas are undeveloped land. Site 6 contains an engineered waste cell. There is a residential area to the south and a golf course is to the east of Site 6. Site 12 was the former civil engineering yard with numerous structures. Site 12 is not currently utilized. Residential land use occurs to the east of Site 17. Air Force commercial facilities such as offices are located to the north and west of the Site 17. Site 19 is currently a part of the operating wastewater treatment plant. Structures relating to plant operations are located on-site and to the west and north. Site 20 and 26 and the adjacent areas are undeveloped land. A former water treatment plant is south of Site 26 and west of Site 20. This facility is no longer used. Site 23 is an active agricultural area, surrounded by currently vacant land to the north, south and east. Air Force land consisting of open space is west of Site 23. Site 25 and the adjacent areas is undeveloped land, with nearby residential development to the south. The three Site 35 subareas and Site 42 are former UST locations within landscaped areas adjacent to structures. The areas near Site 35a, 35b and Site 42 are still actively used as office and dormitory areas, but the Site 35c area is no longer

used. Sites 30 and 40 are open space with some riparian vegetation. A residential area is located to the north and west of Site 40.

The OU2 sites other than site 23 discussed in this AFRPA OU2 ROD are located on that portion of March AFB that may be converted to non-Air Force use. Site 23 is on private land. The anticipated land use for most of the OU2 AFRPA sites is commercial or industrial use as shown in Table 5-1. Alternative land uses have also been assessed and areas of West March could remain open space such as the SKR Conservation Area.

March AFB is located in the North Perris Groundwater Basin. Currently, there are no potable groundwater resources extracted at the OU2 AFRPA sites. The relatively thin water-bearing zone on West March is not anticipated to yield substantial quantities of water. Therefore, the potential for extraction and use of groundwater from the West March AFRPA sites is limited, both now and in the foreseeable future. Water-bearing zones producing sufficient groundwater for use may be present at AFRPA sites on the Main Base and Site 23, and should be considered a potential potable water source.

Surface water is not currently used at the OU2 AFRPA sites. Surface water areas such as at Site 6, 30 and 40 may remain as wetlands depending on future site development.

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## TABLE 5-1
## POTENTIAL FUTURE LAND USE FOR OU2 SITES MANAGED BY AFRPA

| | Site 3 | Site 6 | Site 12 | Site 17 | Site 19 | Site 20/ Site 26 | Site 22 | Site 23 | Site 24 | Site 25 | Site 30 | Site 35 | Site 40 | Sit3 42 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Preferred Land Use** | | | | | | | | | | | | | | |
| Agricultural[1] | | | | | | | | X | | | | | | |
| Business Park | X | | | | | | | | | X | | | | X |
| Commercial | | | | | | | | | | | | X | X | |
| Industrial | | | | | X | | | | X | | X | | | |
| Mixed Use[2] | | | X | X | | | | | | | | | | |
| Public Facilities/ Recreational | | X[6] | | | | X[3] | X | | | | | | | |
| **Alternative Land Uses** | | | | | | | | | | | | | | |
| Agriculture[1] | | | | | | | | X | | | | | | |
| Business Park | | | | X | | | | | | | | X | | |
| Commercial | | | X | | X | | | | | | X | | | |
| Industrial | | | | | X | | | | X | | X | | | |
| Mixed Use[2] | | | | | | | | | | | | X | | X |
| Public Facilities/ Recreational | X | X[6] | | | | X[3] | X | | | | | | | |
| Residential | | | | | | | | | | X | | | | |
| SKR[4] Conservation | X | | | | | X[5] | | | | X | X | X | X | X |

Notes:
[1]Current land use is agricultural. Future land use for this area would be decided by the City of Moreno Valley
[2]**Mixed use: Industrial and Commercial enterprises.**
[3]**Proposed use of Site 26a would be as public facilities/recreation**
[4]Stephens' Kangaroo Rat, a Federally endangered species.
[5]Based on new Biological Opinion, the proposed use of Site 26a as SKR conservation would not be required. Site 26b and Site 20 are on land currently part of the National Cemetery.
[6]Proposed use of Site 6 is passive open space

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# DECISION SUMMARY:
# 6.0 - SUMMARY OF SITE RISKS

# 6.0 SUMMARY OF SITE RISKS

A baseline human health risk assessment was conducted for the AFRPA OU2 sites using data collected during the OU2 RI. The human-health evaluation methodology is provided in Section 2 of the final OU2 RI report for these sites. Ecological risk assessments were also conducted. The methodology is provided in Section 2 of the final OU2 RI. (Tetra Tech, Inc. 1997a)

## 6.1 BASELINE RISK ASSESSMENT

### 6.1.1 Baseline Risk Assessment Methodology

During the OU2 RI, the Air Force considered the potential human health risks associated with the sites. The baseline risk assessment for these sites was performed using both current and future industrial/construction worker and future residential scenarios. In accordance with EPA guidance, it was assumed future site residents and workers could be exposed to chemicals of potential concern detected in surface soils. Accidental ingestion and incidental dermal contact with surface soil (0 to 2 feet) were therefore considered to be potentially complete exposure pathways and were selected for quantitative evaluation, as appropriate. Because DTSC is concerned with the surficial redistribution of near-surface soils during residential development, it was conservatively assumed that future residents may also contact chemicals of potential concern detected in soils up to 10 feet deep.

During future site development, construction workers may be exposed to chemicals in soils. To conform to California EPA guidance, it was conservatively assumed that future construction workers may be exposed to chemicals measured in either surface soils (0 to 2 feet) or near surface soil (0 to 10 feet). The specific soil interval used in the exposure analyses depended on the determination of exposures and risks to future residential receptors. The data from the more substantially affected soil interval (i.e., highest risk to receptors) was used in evaluating exposures to future construction workers.

As described in the RI, the groundwater basin is a potential municipal water source; groundwater could possibly be used for potable purposes in the future. Thus, despite the extremely low likelihood, potential future residential exposure to chemicals of potential concern in groundwater was selected for quantitative evaluation, including ingestion of groundwater, and inhalation of vapors emitted from water during showering. Future residential groundwater exposures were evaluated for on-site residents. It was assumed that off-site residential exposures (if groundwater is used at off-site locations) would be identical to those for on-site residents.

Chemicals in soil can migrate to the atmosphere through volatilization or suspension of soil particles. Chemicals that may be involved in both of these processes may be detected in soil and soil gas samples. The presence of a receptor that might inhale the resulting airborne compounds would complete the air exposure pathway.

Airborne dust may be dispersed to off-site locations such as the nearby industrial workers and residents. They may inhale the airborne dust and thereby be exposed to the chemicals released from soils. Future on-site workers and residents may also inhale fugitive dusts emitted from surface soils, thereby completing the inhalation exposure route. Workers involved with future construction operations may also be exposed to dust generated by excavation or other soil handling activities. If excavated soils were redistributed at the surface, DTSC has indicated a concern for future residents being exposed to the compounds in these soils. Inhalation of airborne dusts was, therefore, identified as a potentially complete exposure pathway. Quantitative evaluation of this soil-related pathway was conducted in conjunction with ingestion and dermal contact of soils.

Whenever chemicals of potential concern are detected in site soils, the potential exists for surface water to be affected by surface runoff. As appropriate, this pathway was also evaluated.

The potential exposure pathways listed in the RI for chemicals of potential concern (COPCs) in surface soil at the AFRPA OU2 sites were ingestion of soil, inhalation of vapors and dust, and direct contact with the skin. Possible exposure pathways for COPCs in groundwater were ingestion, inhalation of vapors, and direct contact with the skin.

Exposure conditions used in the estimation of risk were chosen to represent what is known as "reasonable maximum exposure." Use of these exposure conditions tends to overestimate risk. This effort to overestimate risk is deliberate; it provides risk managers a margin of safety when making cleanup decisions. The combination of the intake variables, expressing the exposure conditions for each receptor at each site, results in a chronic daily dose. The dose is an estimate of exposure for each pathway.

Risks were calculated by integrating the chronic daily dose with toxicity factors. Toxicity factors are numbers that indicate the toxicity of chemicals and are developed by the EPA. The toxicity factor for carcinogenic effects is called a cancer slope factor (CSF) and the toxicity factor for non-carcinogenic effects is called a reference dose (RfD). Compounds that show a potential for both carcinogenic and non-carcinogenic health effects are assigned both slope factors and RfDs. In addition to the EPA-derived slope factors, California EPA (Cal-EPA) has developed CSFs. Toxicity values were obtained from several primary sources, according to the following order of priority: (1) a listing of carcinogenic Slope Factors (SFs) developed by Cal-EPA; (2) the computer files of the EPA's Integrated Risk Information System (IRIS), if toxicity data were not available from Cal-EPA or the toxicity values from IRIS were more conservative than those developed by Cal-EPA, and (3) the annual version of the EPA's Health Effects Assessment Summary Tables (HEAST). Other sources were used where appropriate.

Excess lifetime cancer risks are probabilities that are generally expressed in scientific notation (e.g., $1 \times 10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1 \times 10^{-6}$ indicates that, as a plausible upper bound, an individual has a one-in-a-million additional chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. Guidelines for managing cancer risks are promulgated in the NCP (40 *Code of Federal Regulations* [CFR] 300.430 [e][2][I][A][2]). According to these regulations, excess carcinogenic risks ranging between $10^{-4}$ and $10^{-6}$ may be allowable. *Excess cancer risks below $10^{-6}$ are generally allowable.*

Potential non-carcinogenic effects of a single contaminant in a single medium are expressed as hazard quotients (HQs). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the hazard index (HI) can be generated. The HI provides a useful reference point for gauging across media. The EPA has also established guidelines for non-cancer risks. Using these guidelines, an HI of less than 1 is generally considered protective of human health. If the HI is greater than 1, an assessment of the COPCs contributing to the HI is performed to determine whether the HI represents a non-carcinogenic human health risk above the range identified in the NCP.

The results of the risk assessment for the OU2 AFRPA sites for the contaminants found *prior* to removal actions are summarized in Tables 6-1, 6-2, and 6-3. These tables identify the cancer and/or non-cancer risk for receptors. In addition, they identify the COPCs contributing to the majority of the cancer risk and HI. The site-specific discussions below contain a brief summary of the findings of the baseline human health risk assessment followed by the post-removal action risk evaluation.

**Table 6-1**
**Carcinogenic and Non-Carcinogenic Health Risks**
**From Soil and Soil Vapor**
**AFRPA OU 2 Sites, March AFB *Before* Removal Actions**

| Site No. | Site Name | Carcinogenic Risks >$10E^{-4}$ | | Carcinogenic Risks Between $10E^{-6}$ and $10E^{-4}$ | | Non-Carcinogenic Health Risks (HI>1) | |
|---|---|---|---|---|---|---|---|
| | | Chemical of Concern | Receptor | Chemical of Concern | Receptor | Chemical of Concern | Receptor |
| 3 | Landfill No. 5 | PAHs, PCBs | Future Residents | PAHs | Industrial Workers and Construction Workers | Azinphos methyl (Risks to) | Future Residents and Construction Workers |
| 6a | Landfill No. 4 | PAHs, Dioxins | Future Residents and Industrial Workers | PAHs, Dioxins | Construction Workers | MCPA | Future Residents |
| 6b Quarry | Landfill No. 4 | PAHs | Future Residents and Industrial Workers | PAHs, 4,4'-DDE, 4,4'-DDT | Future Residents and Construction Workers | Aspon, Azinphos methyl, EPN, Mevinphos, Vanadium | Future Residents, Industrial Workers, and Construction Workers |
| 6b Pond | Landfill No. 4 | None Identified | | PAHs, Dioxins | Industrial Workers and Future Residents | Antimony, MCPA | Future Residents and Construction Workers |
| 12 | CE Storage Yard | Wash Rack/Sump Area: PAHs, Chromium VI | Future Residents, Industrial Workers, and Construction Workers | None Identified | Future residents and Industrial Workers | None Identified | |
| 17 | Swimming Pool Fill[1] | PCB | Future Residents and Construction Workers | None Identified | | None Identified | |
| 19 | West March Sludge[2] Drying Beds | PAHs, | Future Residents | PAHs, PCBs, Chromium VI | Future Residents, Industrial Workers, and Construction Workers | Thallium | Residential Child |
| 20 | Landfill No. 7 | PCB, PAHs | Future Residents | PAHs, Dieldrin, PCBs, 1,4-Dichloro-benzene (vapor) | Future Residents, Industrial Workers and Construction Workers | None Identified | |
| 24 | Landfill No. 1 | PCBs, PAHs | Future Residents | PAHs | Industrial Workers and Construction Workers | Antimony | Future Residents |
| 25 | Munitions Residue Burial Site | None Identified | | Benzo(a)pyrene | Future Residents | None Identified | |
| 26 | Water Treatment Sludge | Arsenic | Future Residents and Industrial Workers | Arsenic | Construction Workers | Arsenic | Future Residents and Construction Workers |
| 30 | Construction Rubble Site | None Identified | | None Identified | | None Identified | |
| 35 | 15th Air Force USTs | None Identified | | None Identified | | None Identified | |

Notes: [1]Based on sampling after the removal action. The removal action was conducted prior to the baseline risk assessment.
[2]No removal action conducted. Risks based on conditions at the time of the OU2 RI
HI = Hazard Index
CE = Civil Engineering
UST = Underground storage tank
Sites 22, 23, 40 and 42 are not included on this table, because no quantitative risk assessment was performed.

**Table 6-2**
**Carcinogenic and Non-Carcinogenic Health Risks to Future On-Site Residents**
**From Measured Concentrations in Groundwater**
**AFRPA OU2 Sites, March AFB *Before* Removal Actions**

| Site No. | Site Name | Base Area | Major Contributors to Carcinogenic Risks >$10E^{-4}$ | Major Contributors to Carcinogenic Risks Between $10E^{-6}$ and $10E^{-4}$ | Major Contributors to Non-Carcinogenic Health Risks (HI>1) |
|---|---|---|---|---|---|
| 3 | Landfill No. 5 | West March | None Identified | Atrazine, Benzene, Heptachlor epoxide, Stirophos | Antimony, Thallium, 1,3,5-Trinitrobenzene |
| 6a | Landfill No. 4 | West March | None Identified | None Identified | None Identified |
| 6b Quarry | Landfill No. 4 | West March | None Identified | None Identified | None Identified |
| 6b Pond | Landfill No. 4 | West March | None Identified | None Identified | None Identified |
| 12 | CE Storage Yard | Main Base | None Identified | PCE, TCE | PCE, TCE |
| 17 | Swimming Pool Fill[1] | Main Base | None Identified | Chloroform | None Identified |
| 19 | West March Sludge Drying Beds[2] | West March | Arsenic | None Identified | None Identified |
| 20 | Landfill No. 7 | West March | None Identified | None Identified | None Identified |
| 24 | Landfill No. 1 | West March | None Identified | None Identified | None Identified |
| 25 | Munitions Residue Burial Site | West March | None Identified | RDX | Nickel |
| 26 | Water Treatment Sludge | West March | Arsenic | None Identified | Antimony |
| 30 | Construction Rubble Site | West March | None Identified | Arsenic (groundwater & surface water) | None Identified |
| 35 | 15th Air Force UST | West March | None Identified | None Identified | None Identified |

Notes: [1]Based on sampling after the removal action. The removal action was conducted prior to the baseline risk assessment.
[2]No removal action conducted. Risks based on conditions at the time of the OU2 RI.
HI = Hazard Index
USTs = Underground storage tanks
Sites 22, 23, 40 and 42 are not included on this table because no quantitative risk assessment was performed.

**Table 6-3**
**Carcinogenic and Non-Carcinogenic Health Risks**
**from Chemicals Predicted to Migrate to Groundwater**
**AFRPA OU2 Sites, March AFB *Before* Removal Actions**

| Site No. | Site Name | Base Area | Major Contributors to Carcinogenic Risks >$10E^{-4}$ from Predicted Groundwater Concentrations | Major Contributors to Carcinogenic Risks Between $10E^{-6}$ and$10E^{-4}$ from Predicted Groundwater Concentrations | Major Contributors to Non-Carcinogenic Health Risks (HI>1) from Predicted Groundwater Concentrations |
|---|---|---|---|---|---|
| 3 | Landfill No. 5 | West March | PAHs, PCBs, Dieldrin | None Identified | Azinphos methyl, Demeton, Dichloroprop, Disulfoton, MCPP, Naphthalene, 1,3,5-Trinitrobenzene |
| 6a | Landfill No. 4 | | None Identified | 1,1-DCE, PCE | MCPA, MCPP |
| 6b Quarry | Landfill No. 4 | | None Identified | Heptachlor epoxide | Azinphos methyl, Demeton, Mevinphos |
| 6b Pond | Landfill No. 4 | | None Identified | Dieldrin | MCPA |
| 12 | CE Storage Yard | Main Base | None Identified | 1,4-Dichlorobenzene | Wash Rack: MCPA |
| 17 | Swimming Pool Fill[1] | Main Base | None Identified | None Identified | None Identified |
| 19 | West March Sludge Drying Beds[2] | West March | Dieldrin, Heptachlor epoxide | None Identified | 4-Chloroaniline |
| 20 | Landfill No. 7 | West March | None Identified | 1,4-Dichlorobenzene | None Identified |
| 24 | Landfill No. 1 | West March | Benzene, PCBs | None Identified | None Identified |
| 25 | Munitions Residue Burial Site | West March | None Identified | None Identified | None Identified |
| 26 | Water Treatment Sludge | West March | None Identified | None Identified | None Identified |
| 30 | Construction Rubble | West March | None Identified | None Identified | None Identified |
| 35 | 15th Air Force USTs | West March | None Identified | None Identified | None Identified |

Notes: [1] Based on sampling after the removal action. The removal action was conducted prior to the baseline risk assessment.
[2] No removal action conducted. Risks based on conditions at the time of the OU2 RI.
HI = Hazard Index
USTs = Underground Storage Tanks

Sites 22, 23, 40 and 42 are not included on this table because no quantitative risk assessment was performed.

### 6.1.2 Screening Risk Assessment Methodology Using RPRGs

The post-removal action risk evaluation was conducted using preliminary remediation goals or PRGs. As defined in EPA's 1991 *Risk Assessment Guidance for Superfund Volume 1, Part B: Development of Risk-Based Preliminary Remediation Goals*, "PRGs are goals which provide remedial design staff with long-term targets to use during analysis and selection of remedial alternatives Ideally, the PRGs, if achieved, should both comply with applicable or relevant and appropriate requirements [i.e., maximum contaminant levels (MCLs), National Ambient Water Quality Criteria (NAWQCs), etc.] and result in residual risks that fully satisfy the NCP requirements for the protection of human health and the environment."

PRGs are concentration targets for individual chemicals for specific medium and land use combinations. There are two sources generally used for the derivation of chemical-specific PRGs: 1) concentrations based upon applicable or relevant and appropriate requirements and 2) concentrations based upon risk assessment or risk-based calculations. The risk-based *Residential* PRGs (RPRGs) found in EPA's 1999 *Region 9 Preliminary Remediation Goals (PRGs)* were used to evaluate risk during and after removal action efforts at March AFB. This approach follows the methodology discussed and approved by Air Force, EPA, DTSC, and RWQCB and documented in the Administrative Record.

### 6.1.3 Summary of Human Health Risks at the AFRPA OU2 Sites

**Site 3 – Landfill No. 5**

The results of the baseline risk assessment for the contaminants detected in the soil, landfilled material, and groundwater prior to the removal action indicated carcinogenic and non-carcinogenic risks to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3) that were above the manageable risk range identified in the NCP. To mitigate these risks and protect groundwater, a removal action was performed as previously described. Non-hazardous contaminated soils and landfilled debris have been removed from Site 3 and disposed of in the Site 6 waste cells. Hazardous waste was removed from the Base and properly disposed. After completion of excavation activities for the removal action, 27 confirmation samples were taken to confirm that any residual contamination would not pose a risk to human health (Figure 6-1) (IT Corporation 1997b).

The sampling showed residual PAHs and one PCB in surface/near-surface soils and sediments (Table 6-4). The PCB detected in one sample (Aroclor 1242) was at concentrations lower than the 1999 RPRG of 0.22 milligram per kilogram (mg/kg). Most PAHs were orders of magnitude less than their respective RPRGs, except for one sample (S001) with benzo(a)pyrene at about one order of magnitude above the RPRG. A second sample (S001a) taken in this area did not show detectable PAHs. Additionally, this area is periodically burned to improve SKR habitat and PAHs could result from this activity. No other volatile organics, semivolatile organics, organochlorine pesticides, chlorinated herbicides, organophosphorus pesticides, or nitroaromatics/nitroamines were detected in the confirmation samples. Therefore, the residual organic compounds in soils and sediments after the removal action are not pervasive and some may be related to non-landfilling activities. Based on the maximum concentrations of detected organics the reasonable maximum exposure carcinogenic risks to future residents are within the manageable risk range of $10^{-4}$ to $10^{-6}$ and less than 1 for non-carcinogenic risks.

Metals concentrations in soil samples were below RPRGs for all detected metals except arsenic (Table 6-5). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Therefore, potential residual metals in soils after the removal action do not pose a risk above the manageable risk range identified in the NCP to residential receptors based on RPRGs and background soil concentrations.

Metals concentrations in sediment and surface water samples were below RPRGs for all detected metals except arsenic and iron (Table 6-6). Most metals concentrations are orders of magnitude below their respective RPRGs. However, arsenic exceeds the RPRG but is within the range of background for arsenic in soils for the OU2 West March as documented in the OU2 RI. One sediment sample exceeds the RPRG for iron by a factor of slightly over 2, resulting in a non-carcinogenic risk of about 2, but the average is within the range of iron concentrations in background samples.

The mafic dikes associated with the geology of West March have high iron concentrations and could result in isolated locations with elevated iron content, especially in sediments where heavy elements would be concentrated. Therefore, potential residual metals in sediments and surface water after the removal action do not pose a risk above the manageable risk range identified in the NCP to residential receptors based on RPRGs and background soil concentrations.

Groundwater sampling conducted at Site 3 after the removal action has shown no detectable concentrations of the contaminants that were detected prior to the removal action. The removal action at Site 3 has eliminated the potential for migration of contaminants to groundwater.

Based on the results of confirmation samples, Site 3 no longer poses a threat to human health above the manageable range identified in the NCP and no further action is required. Contaminated soil and debris have been removed and confirmation samples confirm that the residual risk is currently within the manageable risk range. The estimated risk level is based on maximum detected concentrations and likely overestimates the actual exposures to residents. Additionally, the proposed future use of this area is commercial, and commercial receptors would have limited soil and sediment contact. A proposed alternative land use is as a SKR conservation area. For this land use, limited human exposures are anticipated. The site also has been covered with clean backfill, interrupting the exposure pathway for any receptor.

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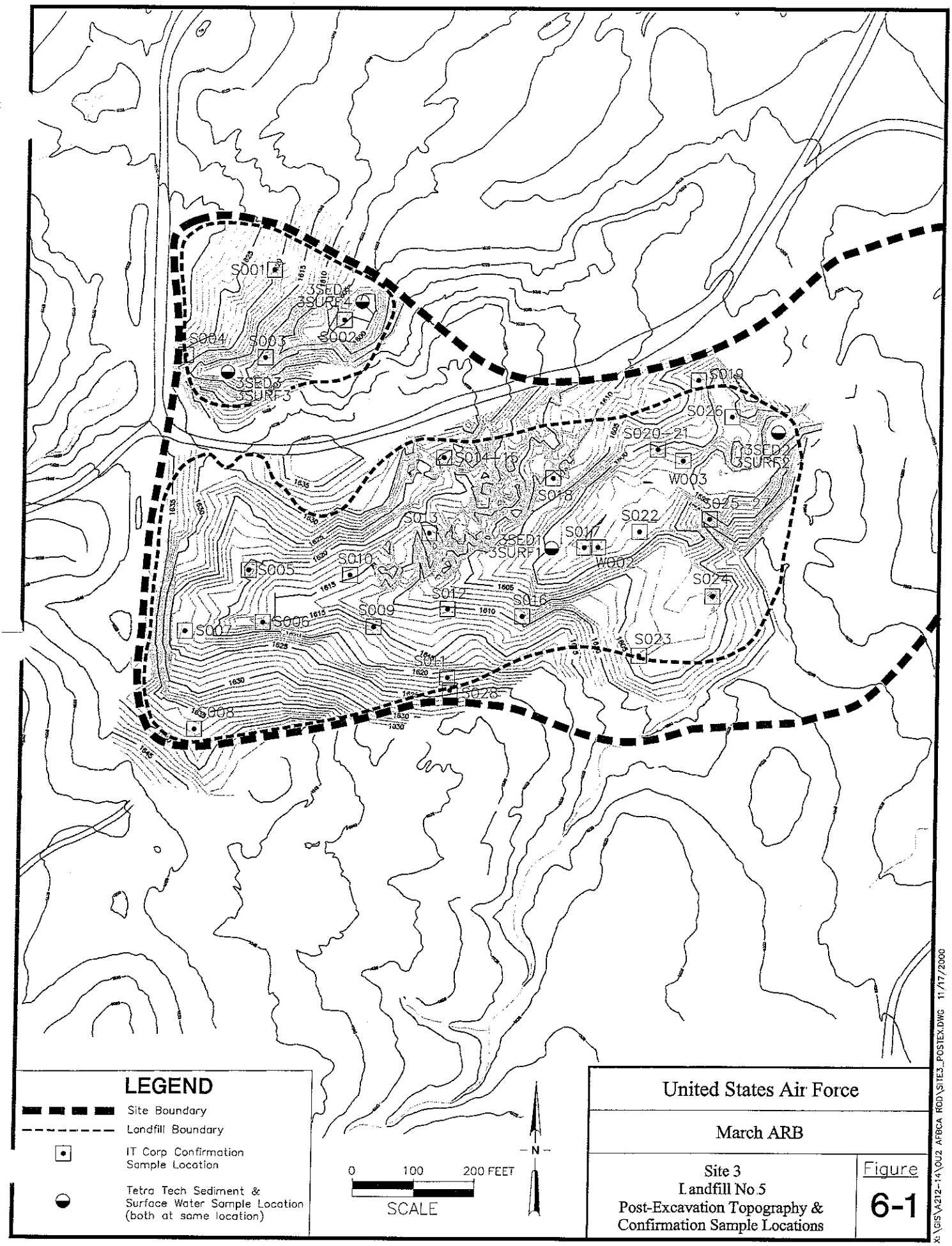
S001
3SED4
3SURF4
S004
S003
S002
3SED3
3SURF3
S019
S026
S020-21
3SED2
3SURF2
S014-15
S018
W003
S025
S022
S017
S013
3SED1
3SURF1
W002
S010
S005
S024
S012
S016
S009
S007
S006
S023
S011
S028
S008
LEGEND
Site Boundary
Landfill Boundary
IT Corp Confirmation Sample Location
Tetra Tech Sediment & Surface Water Sample Location (both at same location)
0
100
200 FEET
SCALE
N
United States Air Force
March ARB
Site 3
Landfill No.5
Post-Excavation Topography & Confirmation Sample Locations
Figure
6-1
X:\GIS\A212-14\OU2 AFBCA ROD\SITE3_POSTEX.DWG 11/17/2000

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**Table 6-4**
**Analytical Results for Organics Detected in Confirmation Soil Samples**
**Site 3 – Landfill No. 5**
**(mg/kg)**

| Analyte | Method | Sample No. | | | | RPRG [1] |
|---|---|---|---|---|---|---|
| | | S001 | S012 | S021 | S028 | |
| Aroclor 1242 | 8080 | <0.0034 | 0.059 | <0.0034 | <0.0034 | 0.22 |
| Acenapthylene | 8310 | 2.900 | <0.002 | <0.002 | NR | 3,700 |
| Phenanthrene | 8310 | 0.510 | <0.0006 | <0.0006 | NR | 56[2] |
| Fluoranthene | 8310 | 1.000 | <0.0002 | <0.0002 | NR | 2,300 |
| Pyrene | 8310 | 0.750 | <0.0003 | <0.0003 | NR | 2,300 |
| Benzo(a)anthracene | 8310 | 0.470 | <0.00008 | <0.00008 | NR | 0.62 |
| Chrysene | 8310 | 0.590 | <0.0002 | 0.46 | NR | 62 (6.1*) |
| Benzo(b)fluoranthene | 8310 | 0.410 | <0.0002 | <0.0002 | NR | 0.62 |
| Benzo(k)fluoranthene | 8310 | 0.300 | <0.00002 | <0.00002 | NR | 6.2 (0.61*) |
| Benzo(a)pyrene | 8310 | 0.590 | <0.00005 | <0.00005 | NR | 0.062 |
| Indeno(1,2,3-cd)pyrene | 8310 | 0.440 | <0.0002 | <0.0002 | NR | 0.62 |

Notes: Only those samples with detectable concentrations of the analytes are listed
1 = RPRGs (Preliminary Remediation Goal) Residential Soil (set to $1x10^{-6}$, or HQ of 1), EPA Region IX, 1999.
2 = Naphthalene used as surrogate
< = Concentration less than listed method detection limit.
mg/kg = milligrams per kilogram
* = Cal-Modified RPRG
NR = Not Requested

# Table 6-5
## Analytical Results for Metals Detected in Confirmation Soil Samples
## Site 3 – Landfill No. 5
## (mg/kg)

| Analyte | Method | Sample No. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S001 | S002 | S003 | S004 | S005 | S006 | S007 | S008 | S009 | S010 | S012 | S013 |
| As | 7060 | 0.47 | 0.81 | 0.8 | 0.45 | <0.38 | 0.47 | 0.7 | 0.72 | 0.66 | 0.78 | 0.81 | 1 |
| Ba | 6010 | 211 | 208 | 260 | 242 | 705 | 339 | 320 | 296 | 403 | 378 | 279 | 349 |
| Be | 6010 | <0.14 | <0.14 | <0.14 | <0.14 | 0.21 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| Cr | 6010 | 18.2 | 19.2 | 20.5 | 16.1 | 26.1 | 15.3 | 14.2 | 21.1 | 40.2 | 24.2 | 16.6 | 17.1 |
| Co | 6010 | 9.4 | 12.5 | 13 | 10.9 | 18.8 | 11 | 11.4 | 13.5 | 16 | 15.2 | 11.3 | 12.2 |
| Cu | 6010 | 9.5 | 16.8 | 8.6 | 11.3 | 3.9 | 11.6 | 6.8 | 15 | 21.2 | 13.6 | 11.2 | 10.8 |
| Pb | 6010 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Ni | 6010 | 4.5 | 6.7 | 6.5 | 5.5 | 7.3 | 4.2 | 5.3 | 5.7 | 16 | 7.2 | 5.7 | 6.5 |
| V | 6010 | 36 | 49.6 | 56.4 | 39.5 | 65.3 | 47.2 | 43.1 | 62.6 | 55.6 | 58.8 | 43.5 | 43.7 |
| Zn | 6010 | 28.9 | 39.2 | 44.2 | 33.9 | 70.7 | 35 | 36.2 | 51.6 | 52.3 | 47.2 | 40.6 | 33.8 |

| Analyte | Method | Sample No. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S014 | S015 | S016 | S017 | S018 | S019 | S020 | S021 | S022 | S023 | S024 | S025 |
| As | 7060 | 0.91 | 0.61 | 1.4 | 2.3 | 0.39 | 0.76 | 0.81 | 0.57 | 0.76 | 0.94 | 0.72 | 0.64 |
| Ba | 6010 | 367 | 306 | 189 | 116 | 338 | 266 | 197 | 286 | 355 | 199 | 322 | 484 |
| Be | 6010 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| Cr | 6010 | 20 | 17.8 | 19.4 | 20.2 | 19.5 | 16 | 14.8 | 21.9 | 15.1 | 16.6 | 13.5 | 21.5 |
| Co | 6010 | 15.7 | 12.5 | 22.4 | 8.4 | 15.7 | 11.4 | 11.5 | 17.5 | 11.6 | 11.5 | 12.4 | 14.5 |
| Cu | 6010 | 13 | 7.9 | 45.2 | 10.5 | 5.8 | 7.2 | 12.4 | 6 | 5.1 | 10.2 | 10.8 | 2 |
| Pb | 6010 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Ni | 6010 | 6 | 5.9 | 6.1 | <4 | 6.3 | 5 | 4.7 | 6.9 | 5.2 | 5.4 | 5.4 | 5.8 |
| V | 6010 | 42.7 | 47.3 | 48.6 | 52.6 | 50.7 | 46.5 | 42.5 | 62.7 | 40.7 | 42.7 | 39.9 | 55 |
| Zn | 6010 | 36 | 37.6 | 38.1 | 34.7 | 42.6 | 34.7 | 45.7 | 108 | 37.2 | 35.3 | 35.9 | 51.9 |

| Analyte | Method | Sample No. | | Maximum Concentration | Mean Concentration | RPRGs [1] | Background Maximum Concentration |
|---|---|---|---|---|---|---|---|
| | | S026 | S027 | | | | |
| As | 7060 | 1.2 | <0.38 | 2.3 | 0.77 | 0.39 | 5.26 |
| Ba | 6010 | 189 | 408 | 705 | 308.15 | 5400 | 552 |
| Be | 6010 | <0.14 | <0.14 | 0.27 | 0.087 | 150 | 10.95 |
| Cr | 6010 | 23.1 | 16.1 | 40.2 | 19.4 | 210 | 29.1 |
| Co | 6010 | 14.9 | 11.9 | 22.4 | 13.35 | 4700 | 16.1 |
| Cu | 6010 | 8.8 | 7.1 | 45.2 | 11.24 | 2900 | 17 |
| Pb | 6010 | <5 | <5 | <5 | ND | 400 | 17.2 |
| Ni | 6010 | 5.8 | 4.2 | 16 | 5.99 | 150 | 10.4 |
| V | 6010 | 61.5 | 43.5 | 65.3 | 49.17 | 550 | 75.4 |
| Zn | 6010 | 42 | 42.3 | 108 | 43.68 | 23,000 | 65.2 |

Notes: For the purpose of calculating mean concentrations, non-detects are considered equal to 1/2 the reporting limit.
[1] = RPRG (Preliminary Remediation Goal), Residential Soil (set to $1x10^{-6}$ or HQ of 1), EPA Region IX, 1999.
< = Concentration less than listed method detection limit.
mg/kg = milligrams per kilogram

**Table 6-6**
**Analytical Results for Metals in Confirmation**
**Sediment and Surface Water Samples**
**Site 3 - Landfill No. 5**
**(mg/kg or mg/L)**

| Analyte | Sediment Sample No. | | | | Mean Concentration | RPRGs[1] | Background Maximum Concentration | Surface Water (filtered) Sample No. | | | | Mean Concentration | Surface Water (unfiltered) Sample No. | | | | Mean Concentration | Tap Water RPRGs[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3SED-1 | 3SED-2 | 3SED-3 | 3SED-4 | | | | 3SURF1-F | 3SURF2-F | 3SURF3-F | 3SURF4-F | | 3SURF1-U | 3SURF2-U | 3SURF3-U | 3SURF4-U | | |
| | mg/kg | | | | | | | mg/L | | | | | mg/L | | | | | |
| Al | 9,100 | 31,000 | 8,600 | 7,500 | 14,050 | 76,000 | 27,900 | BJ | 0.12 J | BJ | BJ | 0.12 | 9.3 | 27 | 4.5 | 0.20 J | 10.25 | 36,000 |
| Sb | 0.82 J | <0.3 | 1.0 J | 0.97 J | 0.735 | 31 | | <0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0026 | 0.0037 J | <0.0026 | 0.0019 | 15 |
| As | 1.1 | 3.2 | B | 1.5 J | 1.933 | 0.39 | 5.26 | 0.0034 J | 0.0085 | 0.0026 J | 0.0041 J | 0.0047 | 0.0037 | 0.014 | 0.0030 J | 0.0042 J | 0.0062 | 0.045 |
| Ba | 260 | 690 | 260 | 200 | 352.5 | 5400 | 552 | 0.34 | 0.17 | 0.13 | 0.11 | 0.188 | 0.61 | 0.69 | 0.24 | 0.11 | 0.4125 | 2600 |
| Be | B | 0.53 | BJ | BJ | 0.53 | 150 | 10.95 | BJ | BJ | BJ | BJ | | BJ | 0.00095 J | BJ | BJ | 0.00095 | 73 |
| Cd | <0.38 | 0.34 J | <0.38 | <0.053 | 0.1933 | 37 (9.0*) | | <0.00053 | <0.00053 | <0.00053 | <0.00053 | <0.00053 | <0.00053 | <0.00053 | <0.00053 | <0.00053 | <0.00053 | 18 |
| Cr | 12 | 40 | 14 | 12 | 19.5 | 210 | 29.1 | 0.0019 J | 0.0019 J | 0.0017 J | 0.0018 J | 0.0018 | 0.013 | 0.029 | 0.0085 J | 0.0017 J | 0.0131 | |
| Co | 9.5 | 29 | 10 | 8.9 | 14.35 | 4700 | 16.1 | 0.0043 J | 0.0024 J | <0.0023 | <0.0023 | 0.0023 | 0.014 J | 0.022 | 0.0025 J | <0.0023 | 0.0099 | 2200 |
| Cu | 9.2 | 42 | 11 | 8.2 | 17.6 | 2900 | 17 | 0.0058 J | 0.011 | 0.0014 J | 0.0045 J | 0.0057 | 0.017 | 0.046 | 0.011 | 0.0066 J | 0.0202 | 1400 |
| Fe | 14,000 | 53,000 | 17,000 | 13,000 | 24,250 | 23,000 | 31,000 | 0.032 J | 0.12 | 0.018 J | 0.018 J | 0.047 | 15 | 34 | 7.2 | 0.21 | 14.1 | 11,000 |
| Pb | 1.3 | 21 | 3.2 | 1.9 | 6.85 | 400 | 17.2 | <0.0027 | <0.0027 | <0.0027 | <0.0027 | <0.0027 | <0.0027 | 0.023 | 0.0039 | <0.0027 | 0.0074 | |
| Mg | 6,100 | 17,000 | 5,900 | 5,300 | 8,575 | | 9,940 | 55 | 83 | 21 | 35 | 48.5 | 57 | 93 | 24 | 36 | 52.5 | |
| Mn | 280 | 810 | 190 | 230 | 377.5 | 1800 | 561 | 0.5 | 0.12 | 0.088 | 0.0080 J | 0.179 | 0.9 | | 0.39 | 0.072 | 0.5905 | 880 |
| Mo | <0.28 | 0.66 J | <0.28 | <0.28 | 0.27 | 390 | 11.2 | 0.018 J | 0.027 J | <0.0027 | 0.0097 J | 0.014 | 0.019 J | 0.025 J | 0.0032 J | 0.0098 J | 0.0143 | 180 |
| Ni | 5.1 | 18 | 5.9 | 4.9 | 8.475 | 1600(150*) | 10.4 | 0.014 | 0.0051 J | 0.0037 | 0.030 J | 0.0132 | 0.014 | 0.0036 J | 0.007 | 0.021 J | 0.0456 | 730 |
| Se | 0.56 J | <0.34 | 1.6 | <1.4 | 0.7575 | 390 | | <0.0029 | 0.0040 J | 0.0030 J | <0.0029 | 0.0025 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | 180 |
| Ag | <0.15 | 0.47 | 3.1 | 0.19 J | 0.959 | 390 | | <0.0013 | <0.0013 | <0.0013 | <0.0013 | <0.0013 | <0.0013 | <0.0013 | <0.0013 | <0.0013 | <0.0013 | 180 |
| Tl | 0.90 J | <0.65 | <0.65 | <3.2 J | 0.78 | 6.3 | | <0.0064 | <0.0064 | <0.0064 | <0.0064 | <0.0064 | <0.0064 | <0.0064 | <0.0064 | <0.0064 | <0.0064 | 2.9 |
| V | 38 | 120 | 40 | 37 | 58.75 | 550 | 75.4 | 0.023 | 0.04 | 0.014 | 0.027 | 0.026 | 0.064 | 0.12 | 0.029 | 0.027 | 0.06 | 260 |
| Zn | 37 | 140 | 43 | 31 | 62.75 | 23,000 | 65.2 | 0.017 | 0.03 | 0.0050 J | 0.011 | 0.0158 | 0.055 | 0.12 | 0.04 | 0.027 | 0.0605 | 11,000 |

Notes:
< = Analyte not detected followed by the Method Detection Limit.
J = Result is between the PQL and MDL. Analyte was positively identified, but the concentration is uncertain.
B = Analyte was detected in the associated method or field blank(s).
NC = Not calculated.
[1] = RPRG (Preliminary Remediation Goal), Residential Soil (set to $10^{-6}$, or HQ of 1), EPA Region IX, 1999.
[2] = RPRG (Preliminary Remediation Goal), Tap Water, EPA Region IX, 1999.
* = Cal-Modified RPRG
mg/L = milligrams per liter.
mg/kg = milligrams per kilogram.

**Site 6a - Landfill No. 4**

The results of the baseline risk assessment based on the contaminants detected in the soil and landfilled materials prior to the removal action indicated carcinogenic and non-carcinogenic risks above the manageable risk range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed as previously described. Confirmation samples were not collected at Site 6a because the removal action was implemented as a closure in place, rather than a clean closure. A capping system was placed over the waste cells containing the consolidated waste and soil to prevent infiltration of surface water and subsurface migration of contaminants (IT Corporation 1997c). The capping system also isolates the contained waste material from potential human and ecological receptors. Capping of the material has disrupted the exposure pathway. The removal action at Site 6a has eliminated the potential for migration of contaminants to groundwater.

Therefore, no further removal of soil or cleanup of groundwater is required at Site 6a to protect human health. The existing waste cells and related systems require operation and maintenance, and regularly scheduled monitoring of groundwater in accordance with the regulatory approved post closure plans.

**Site 6b Quarry - Landfill No. 4**

The results of the baseline risk assessment based on the contaminants detected in the soil and landfilled materials prior to the removal action indicated carcinogenic and non-carcinogenic risks above the manageable risk range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed as previously described. Three confirmation samples (including one duplicate) were collected (IT Corporation 1997d).

The sampling detected only one organic compound, the dioxin OCDD at 0.000024 mg/kg in soil in one sample. Based on a Toxicity Equivalence Factor (TEF) of 0.0001 for OCDD, the equivalent dioxin TCDD concentration is $2.4 \times 10^{-9}$ mg/kg, orders of magnitude below the residential RPRG of $3.9 \times 10^{-6}$ mg/kg. No other volatile organic compounds, semivolatile organic compounds, organochlorine pesticides, PCBs, chlorinated herbicides, organophosphorus pesticides, dioxins/furans or nitroaromatics/nitroamines were detected in the confirmation samples. The removal action at Site 6b Quarry has eliminated the potential for migration of contaminants to groundwater. Based on the maximum concentrations, risks from organic compounds at Site 6b quarry after the removal action are within the manageable risk range identified in the NCP.

Metals concentrations in soil samples were below RPRGs for all detected metals except arsenic (Table 6-7). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Therefore, potential residual metals in soils after the removal action do not pose a risk above the manageable range to residential receptors based on RPRGs and background soil concentrations.

Based on the results of confirmation samples, the Site 6b Quarry no longer poses a threat to human health and no further action is required. Contaminated soil and debris have been removed and confirmation samples confirm that the carcinogenic and non-carcinogenic risk has been reduced to less than $10^{-6}$ and 1, respectively, for residential receptors.

**Table 6-7**
**Analytical Results for Metals in Confirmation Sediment Samples**
**Site 6b Quarry – Landfill No. 4**
**(mg/kg)**

| Analyte | Method | Sample No. | | | Maximum Background Level | RPRGs |
|---|---|---|---|---|---|---|
| | | MAFBS6B'S010 | MAFBS6B'S011 | MAFBS6B'S012 | | |
| Sb | 6010 | <6 | <6 | <6 | ND | 31 |
| As | 7060 | 0.82 | 0.66 | 0.86 | 5.26 | 0.39 |
| Ba | 6010 | 294 | 376 | 493 | 552 | 5400 |
| Be | 6010 | 0.17 | 0.16 | 0.19 | 10.95 | 150 |
| Cd | 6010 | <0.5 | <0.5 | <0.5 | ND | 37 (9.0*) |
| Cr | 6010 | 16.7 | 27.2 | 31.9 | 29.1 | 210 |
| Co | 6010 | 12.9 | 19.1 | 24.7 | 16.1 | 4700 |
| Cu | 6010 | 12.5 | 21 | 28.8 | 17 | 2900 |
| Pb | 6010 | <5 | <5 | <5 | 17.2 | 1600(150*) |
| Hg | 7471 | <0.1 | <0.1 | <0.1 | 0.077 | 23 |
| Ni | 6010 | 5.8 | 7.9 | 10.3 | 10.4 | 400 |
| Se | 7740 | <0.5 | <0.5 | <0.5 | ND | 390 |
| Ag | 6010 | <1 | <1 | <1 | ND | 390 |
| Tl | 6010 | <50 | <50 | <50 | ND | 6.3 |
| V | 6010 | 46.6 | 70.2 | 92.5 | 75.4 | 550 |
| Zn | 6010 | 42.7 | 61.4 | 81.4 | 413 | 23,000 |

Notes:
NA = Not Analyzed
ND = Not Detected
< = Analyte not detected, followed by Method Detection Limit (MDL)
[1] = RPRGs (Preliminary Remediation Goal), Residential Soil (set to $1x10^{-6}$, or HQ of 1) EPA Region IX, 1999.
* = Cal-modified RPRG
mg/kg = milligrams per kilogram

**Site 6b Pond - Landfill No. 4**

The results of the baseline risk assessment based on the contaminants detected in the soil and landfilled materials prior to the removal action indicated carcinogenic and non-carcinogenic risks above the manageable range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed as previously described. Confirmation samples were collected from Site 6b Pond after removal of soil and debris (Figure 6-2). Seven soil samples, seven sediment samples, and two surface water samples were collected (IT Corporation 1997d).

Organic compounds were detected in several soil and sediment samples. 4,4'-DDT and 4, 4'-DDD were detected in one soil sample at concentrations of 0.0037 mg/kg and 0.0052 mg/kg, respectively, several orders of magnitude less than the respective RPRGs of 1.7 and 2.4 mg/kg. PAHs were detected in soil samples (Tables 6-8), but no concentrations exceeded RPRGs. Some long-chain hydrocarbons were also detected in soil and sediment samples (Table 6-9). Dioxins and furans were detected in soil samples (Table 6-10). Based on the sample with the maximum concentrations, the equivalent dioxin TCDD concentration is $1x10^{-5}$ mg/kg, approximately one order of magnitude above the residential RPRG of $3.9x10^{-6}$ mg/kg, but within the manageable carcinogenic risk range of $10^{-4}$ to $10^{-6}$. The concentration of dioxins and furans in the remaining samples is generally orders of magnitude less. No other volatile organic compounds, semivolatile organic compounds, organochlorine pesticides, PCBs, chlorinated herbicides, organophosphorus pesticides, dioxins/furans or nitroaromatics/nitroamines were detected in the confirmation soil or sediment samples. Based on the maximum concentrations, there are no risks above the manageable risk range to residential receptors from organic compounds at Site 6b Pond.

The removal action at Site 6b Pond has eliminated the potential for migration of contaminants to groundwater. Metals concentrations in soil and sediment samples were below RPRGs for all detected metals except arsenic and thallium (Table 6-11). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Thallium is not believed to be elevated because the test methodology at the time of the RI caused overestimation of thallium concentrations due to iron interference. Therefore, potential residual metals in soils after the removal action do not pose a risk above the manageable range to residential receptors based on RPRGs and background soil concentrations at Site 6b Pond.

No volatile organic compounds, semivolatile organic compounds, organochlorine pesticides or PCBs were detected in the surface water samples from the Site 6b Pond. Only two metals were detected, barium and zinc (Table 6-12). No MCLs or RPRGs were exceeded. MCLs were used as action levels in this case because this pond is recharged by groundwater.

Based on the results of confirmation samples, the Site 6b Pond no longer poses a threat to human health above the manageable range identified in the NCP and no further action is required. Contaminated soil and debris have been removed and confirmation samples confirm that the risk has been reduced to levels within the manageable range. The estimated risk level is based on conservative exposure assumptions and maximum detected concentrations; and therefore, likely overestimates the actual exposures to residents.

**Site 12 - Civil Engineering Yard**

The results of the baseline risk assessment based on the contaminants detected in the soil prior to the removal action indicated carcinogenic and non-carcinogenic risks above the manageable risk range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed in the wash rack area as previously described. Confirmation samples were taken to document the effectiveness of the removal action in mitigating risk (Figure 6-3) (IT Corporation 1997e).

The confirmation samples show residual PAHs and pesticides (Table 6-13) All detected compounds were orders of magnitude less than the RPRGs. Petroleum hydrocarbons were detected in the soil samples. The regulators agreed that residual petroleum hydrocarbons could remain in place because the physical setting would limit exposure. Additionally, petroleum hydrocarbons are excluded under CERCLA. No other volatile organics, semivolatile organics, organochlorine pesticides, chlorinated herbicides, organophosphorus pesticides, or nitroaromatics/nitroamines were detected in the confirmation samples. Therefore, no organic compounds show risk above the manageable range at the washrack area after the removal action.

Metals testing in the excavation at the washrack show some metals may continue to be a risk to residential receptors. Metals concentrations in soil samples were below RPRGs for all detected metals except arsenic, cadmium and hexavalent chromium (Table 6-14). Most metals concentrations are orders of magnitude below their respective RPRGs. Cadmium concentrations (to 20 mg/kg) are higher than the Cal Modified RPRG of 9 mg/kg but well below the industrial PRG of 810 mg/kg. Hexavalent chromium concentrations (1.8 mg/kg) are higher than the Cal Modified residential RPRG of 0.2 RPRG but well below the industrial RPRG of 64 mg/kg.

Some arsenic concentrations exceed the RPRG, but are within the background levels for soils on the Main Base established in the OU2 RI. As with the residual petroleum hydrocarbons, the regulators agreed that these metals could remain in place because the physical setting would limit exposure.

In the past, the 1-1 DCE vapors concentrations found in shallow soils at Site 12 were thought to pose an unacceptable cancer risk to potential future residents. Recently (circa 2002), 1-1 DCE was determined to not be a suspected human carcinogen. The RPRG is now approximately 1000 times less stringent. Therefore, the 1-1 DCE vapors in shallow soils at Site 12 do not pose a risk to potential future residents or industrial workers.

Based on analytical results from samples taken after the removal action at the wash rack and residual contamination in the groundwater, Site 12 continues to show a risk within the risk range identified in the NCP to potential future residents. Carcinogenic risk to industrial workers, if no controls are imposed, is slightly above $1x10^{-6}$ risk but within the risk range identified in the NCP. Contact and ingestion of soil, and use of the groundwater may cause levels of risk above the range identified in the NCP to residents. Remedial alternatives were evaluated to control potential risks. Remedial alternatives are described in Section 7, Description of Alternatives.

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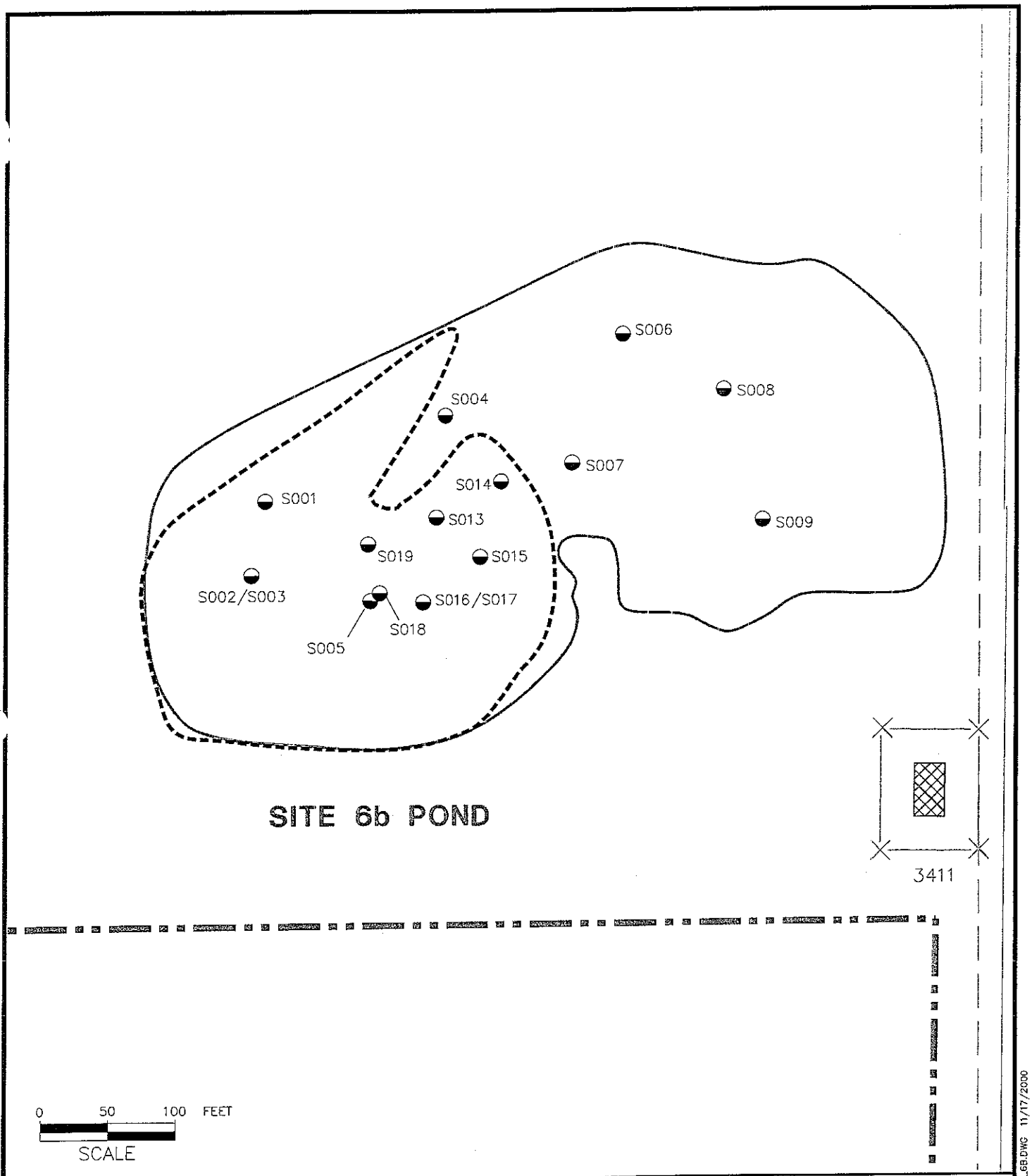
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Landfill No.4
Confirmation Sample Locations
Figure
6-2
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**Table 6-8**
**Analytical Results for Volatile/Semivolatile Organics in Confirmation Soil and Sediment Samples**
**Site 6b Pond - Landfill No. 4**
**(mg/kg)**

| Analyte | Method | Sample No. | | | | | | | | | Maximum Concentration | Mean Sample Concentration | RPRGs[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAFB S6B'S001 | MAFB S6B'S002 | MAFB S6B'S003 | MAFB S6B'S004 | MAFB S6B'S005 | MAFB S6B'S006 | MAFB S6B'S007 | MAFB S6B'S008 | MAFB S6B'S009 | | | |
| 2-Butanone | 8260 | <0.01 | <0.01 | <0.01 | <0.01 | 0.012 | | | | | 0.012 | 0.006 | 7,300 |
| Phenanthrene | 8310/8270 | <0.12 | <0.12 | <0.12 | <0.12 | 1.9 | 0.49 | <0.33 | <0.33 | <0.33 | 1.9 | 0.33 | 56[2] |
| Anthracene | 8310 | <0.14 | <0.14 | <0.14 | <0.14 | 0.41 | | | | | 0.41 | 0.14 | 22,000 |
| Pyrene | 8270 | | | | | | 0.58 | <0.33 | <0.33 | <0.33 | 0.58 | 0.25 | 2,300 |
| Fluoranthene | 8270 | | | | | | 0.69 | <0.33 | <0.33 | <0.33 | 0.69 | 0.27 | 2,300 |
| Chrysene | 8270 | | | | | | 0.35 | <0.33 | <0.33 | <0.33 | 0.35 | 0.2 | 62 (6.1*) |
| Benzo(k)fluor-anthene | 8270 | | | | | | <0.004 | 0.0089 | <0.004 | <0.004 | 0.0089 | 0.003 | 6.2 (0.61*) |
| Benzo(b)fluor-anthene | 8310 | | | | | | <0.004 | 0.014 | <0.004 | <0.004 | 0.014 | 0.004 | 0.62 |
| Benzo(b) fluoranthene | 8370 | | | | | | 0.4 | <0.33 | <0.33 | <0.33 | 0.4 | 0.21 | 0.62 |

Notes: * = Cal-modified RPRG
[1] = RPRG (Preliminary Remediation Goal), Residential Soil (set to 1 x $10^{-6}$ or HQ of 1), EPA Region IX, 1999.
[2] = Naphthalene used as surrogate
< = Concentration less than listed method detection limit.
mg/kg = milligrams per kilogram.

**Table 6-9**
**Analytical Results for Hydrocarbon Fuel Tests in Soil and Sediment Samples**
**Site 6b Pond - Landfill No. 4**
**(mg/kg)**

| Analyte | Method | Sample No. | | | | | | | | | | | | | Maximum Concentration |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAFB S6B'S 002 | MAFB S6B'S 003 | MAFB S6B'S 004 | MAFB S6B'S 005 | MAFB S6B'S 006 | MAFB S6B'S 007 | MAFB S6B'S 008 | MAFB S6B'S 009 | MAFB S6B'S 014 | MAFB S6B'S 015 | MAFB S6B'S 016 | MAFB S6B'S 017 | MAFB S6B'S 018 | MAFB S6B'S 019 | |
| Kerosene | MOD 8015 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | NA | NA | NA | NA | NA | NA | |
| Stoddard Solvent | MOD 8015 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | NA | NA | NA | NA | NA | NA | |
| Jet Fuel | MOD 8015 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | NA | NA | NA | NA | NA | NA | |
| Diesel Fuel #2 | MOD 8015 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | |
| TPH (gasoline) | MOD 8015 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | |
| TRPH | 418.1 | <10 | 15 | <10 | 4,800 | <10 | 130 | <10 | <10 | <10 | 11 | 12 | 10 | 13 | <10 | 4,800 |

Notes: NA = Not Analyzed
< = Concentration less than listed method detection limit
mg/kg = Milligrams per kilogram.

**Table 6-10**
**Analytical Results for Dioxins and Furans in Confirmation Soil and Sediment Samples**
**Site 6b Pond - Landfill No. 4[1]**
**(mg/kg)**

| Analyte | Method | Sample No. | | | | | | | | | Maximum Concentration | TEF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAFBS6B' S001 | MAFBS6B' S002 | MAFBS6B' S003 | MAFBS6B' S004 | MAFBS6B' S005 | MAFBS6B' S006 | MAFBS6B' S007 | MAFBS6B' S008 | MAFBS6B' S009 | | |
| TCDFs (total) | 8290 | 5.10E-06 | 1.10E-06 | <6.00E-07 | <6.00E-07 | <6.00E-07 | 1.20E-06 | 7.50E-06 | 1.70E-05 | 1.40E-06 | 1.70E-05 | |
| PeCDFs (total) | 8290 | 9.90E-06 | <1.00E-06 | <1.00E-06 | <1.00E-06 | <1.00E-06 | <1.00E-06 | <1.00E-06 | <1.00E-06 | 5.70E-06 | 5.70E-06 | |
| HxCDFs | 8290 | 1.50E-04 | <6.00E-07 | <6.00E-07 | <6.00E-07 | <6.00E-07 | <6.00E-07 | <6.00E-07 | <6.00E-07 | 2.90E-05 | 2.90E-05 | |
| 1,2,3,4,7,8-HxCDF | 8290 | 2.10E-05 | <6.00E-07 | <6.00E-07 | <6.00E-07 | <6.00E-07 | | | | | | 1.00E-02 |
| HpCDF(total) | 8290 | 6.40E-04 | <9.00E-07 | <9.00E-07 | <9.00E-07 | <9.00E-07 | <9.00E-07 | 2.00E-04 | 1.40E-05 | 5.00E-05 | 2.00E-04 | |
| 1,2,3,4,6,7,8-HpCDF | 8290 | 1.10E-04 | <9.00E-07 | <9.00E-07 | <9.00E-07 | <9.00E-07 | <9.00E-07 | 6.70E-06 | 5.60E-06 | 1.70E-05 | 1.70E-05 | 1.00E-02 |
| 1,2,3,4,7,8,9-HpCDF | 8290 | 1.50E-05 | <2.00E-07 | <2.00E-07 | <2.00E-07 | <2.00E-07 | | | | | | 1.00E-02 |
| OCDF | 8290 | | <2.20E-06 | <2.20E-06 | <2.20E-06 | <2.20E-06 | <2.20E-06 | 2.40E-05 | 1.40E-05 | 3.00E-05 | 3.00E-05 | 1.00E-03 |
| TCDDs (total) | 8290 | | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | 2.70E-06 | <7.00E-07 | 2.70E-06 | |
| HxCDDs (total) | 8290 | | <1.30E-06 | <1.30E-06 | <1.30E-06 | <1.30E-06 | <1.30E-06 | <1.30E-06 | <1.30E-06 | 7.60E-05 | 7.60E-05 | |
| 1,2,3,6,7,8-HxCDD | 8290 | | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | 9.40E-06 | 9.40E-06 | 1.00E-01 |
| 1,2,3,7,8,9-HxCDD | 8290 | | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | <7.00E-07 | 6.80E-06 | 6.80E-06 | 1.00E-01 |
| HpCDDs (total) | 8290 | | <3.00E-06 | <3.00E-06 | <3.00E-06 | <3.00E-06 | 2.00E-05 | 9.10E-05 | 5.10E-05 | 8.00E-04 | 8.00E-04 | |
| 1,2,3,4,6,7,8-HpCDD | 8290 | | <2.20E-06 | <2.20E-06 | <2.20E-06 | <2.20E-06 | 9.00E-06 | 3.20E-05 | 2.00E-05 | 3.90E-04 | 3.90E-04 | 1.00E-02 |
| OCDD | 8290 | | 7.90E-05 | 3.10E-05 | 3.00E-05 | <1.60E-06 | 7.90E-05 | 3.40E-04 | 2.40E-04 | 5.30E-03 | 5.30E-03 | 1.00E-03 |

Notes: < = Concentration less than listed method detection limit.
[1] = This table presents the results for tested congeners of dioxins and furans in these samples.
mg/kg = milligrams per kilogram.
TEF = Toxicity Equivalency Factor.

**Table 6-11**
**Analytical Results for Metals in Confirmation Soil and Sediment Samples**
**Site 6b Pond – Landfill No. 4**
**(mg/kg)**

| Analyte | Method | Soil Sample No. | | | | | | | | Sediment Sample No. | | | | | | Maximum Concentration | Mean Sample Concentration | Maximum Background Levels | RPRGs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAFB S6B'S002 | MAFB S6B'S003 | MAFB S6B'S004 | MAFB S6B'S005 | MAFB S6B'S006 | MAFB S6B'S007 | MAFB S6B'S008 | MAFB S6B'S009 | MAFB S6B'S014 | MAFB S6B'S015 | MAFB S6B'S016 | MAFB S6B'S017 | MAFB S6B'S018 | MAFB S6B'S019 | | | | |
| Sb | 6010 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | | 3 | ND | 31 |
| As | 7060 | <0.38 | 0.50 | 0.65 | 0.68 | 0.57 | 1.0 | 2.5 | 1.2 | 0.64 | 0.66 | 0.39 | 0.45 | 0.49 | 0.31 | 2.5 | 0.73 | 5.26 | 0.39 |
| Ba | 6010 | 354 | 323 | 259 | 84.8 | 397 | 121 | 349 | 291 | 680 | 320 | 550 | 330 | 170 | 170 | 550 | 322 | 552 | 5,400 |
| Be | 6010 | <0.14 | <0.14 | 0.21 | <0.14 | 0.24 | 0.4 | 0.7 | 0.25 | 0.42 | 0.2 | 0.36 | 0.29 | 0.12 | 0.34 | 0.7 | 0.23 | 10.95 | 150 |
| Cd | 6010 | <0.5 | <0.5 | <0.5 | 1.2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 1.2 | 0.3 | ND | 37 (9.0*) |
| Cr | 6010 | 17.3 | 13.7 | 16.4 | 5.9 | 21.5 | 14.7 | 33.5 | 19.2 | 29 | 15 | 23 | 20 | 11 | 15 | 33.5 | 18.7 | 29.1 | 210 |
| Co | 6010 | 14 | 11.4 | 13 | 5 | 17.7 | 9.4 | 20.1 | 12.7 | 18 | 11 | 19 | 16 | 7.2 | <1 | 24.7 | 13.1 | 16.1 | 4,700 |
| Cu | 6010 | 8.7 | 9.8 | 9.2 | 9.7 | 13.7 | 10.7 | 27.2 | 11.1 | 28.8 | 28.8 | 28.8 | 9.4 | 10 | 7.4 | 28.8 | 15.5 | 17 | 2,900 |
| Pb | 6010 | <5 | <5 | <5 | 18.7 | 12.7 | 12.8 | 18.2 | 12.2 | 7.5 | <5 | 5.5 | 6.4 | <5 | <5 | 18.7 | 6.6 | 17.2 | 400 |
| Hg | 7471 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | | 0.005 | 0.077 | 23 |
| Ni | 6010 | 6 | 4.7 | 6.2 | 4 | 8.1 | 8.7 | 14.9 | 7.1 | 26 | 8 | 11 | 11 | 5.2 | <4 | 26 | 8.3 | 10.4 | 1600 (150*) |
| Se | 7740 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | | 0.25 | ND | 390 |
| Ag | 6010 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | | 0.5 | ND | 390 |
| Tl | 6010 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | 13 | 18 | 20 | <50 | <50 | 20 | 23.7 | | 6.3 |
| V | 6010 | 50.2 | 39.6 | 43.1 | 15.3 | 61.7 | 32.9 | 83.4 | 48.1 | 110 | 50 | 92 | 72 | 30 | 38 | 110 | 55.3 | 75.4 | 550 |
| Zn | 6010 | 50.2 | 39.4 | 43 | 114 | 66 | 44.8 | 89.5 | 63.5 | 82 | 41 | 69 | 65 | 23 | 24 | 114 | 57.7 | 413 | 23,000 |

Notes: ND = Not Detected
< = Analyte not detected, followed by method detection limit.
mg/kg = milligrams per kilogram
' = RPRG (Preliminary Remediation Goal), Residential Soil (set to $1x10^{-6}$ or HQ of 1), EPA Region IX, 1999.

**Table 6-12**
**Analytical Results for Metals in Confirmation Surface Water Samples**
**Site 6b Pond - Landfill No. 4**
**(µg/L)**

| Analyte | Method | Sample No. | |
|---|---|---|---|
| | | MAFBS6B'W001 | MAFBS6B'W002 |
| Sb | 6010 | <5 | <5 |
| As | 7060 | <5 | <5 |
| Ba | 6010 | 81 | 170 |
| Be | 6010 | <2 | <2 |
| Cd | 6010 | <2 | <2 |
| Cr | 6010 | <5 | <5 |
| Co | 6010 | <10 | <10 |
| Cu | 6010 | <20 | <20 |
| Pb | 6010 | <3 | <3 |
| Hg | 7471 | <0.5 | <0.5 |
| Mo | 6010 | <20 | <20 |
| Ni | 6010 | <40 | <40 |
| Se | 7740 | <5 | <5 |
| Ag | 6010 | <5 | <5 |
| Tl | 6010 | <10 | <10 |
| V | 6010 | <10 | <10 |
| Zn | 6010 | <20 | 22 |

Notes: < = Concentration less than listed method detection limit
µg/L = micrograms per liter

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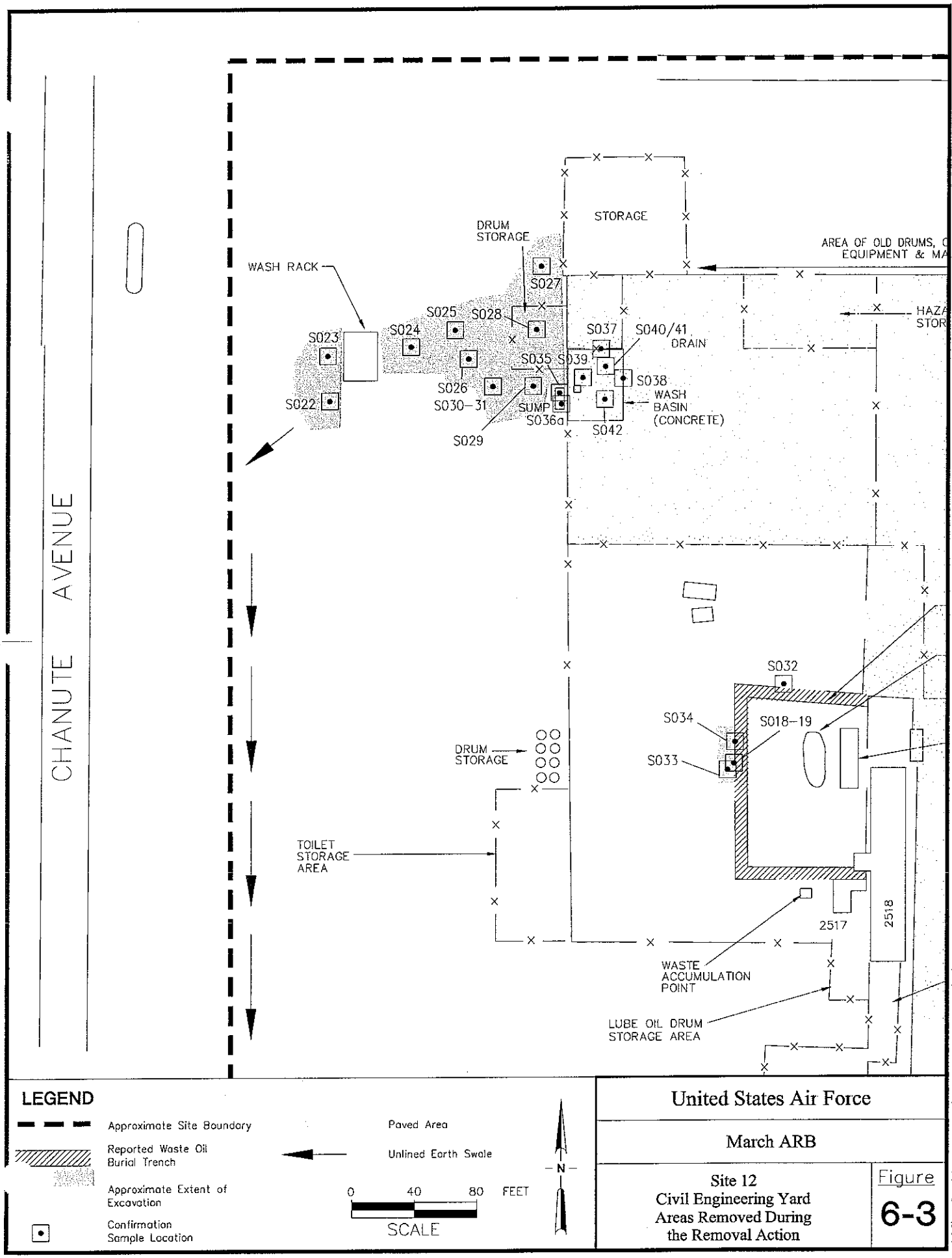
CHANUTE AVENUE
STORAGE
DRUM STORAGE
AREA OF OLD DRUMS, C
EQUIPMENT & MA
WASH RACK
S027
S025
S028
S024
S023
S037
S040/41
DRAIN
HAZA
STOR
S035
S039
S026
S038
S030–31
S022
SUMP
S036a
WASH BASIN (CONCRETE)
S042
S029
S032
S034
S018–19
S033
DRUM STORAGE
TOILET STORAGE AREA
2517
2518
WASTE ACCUMULATION POINT
LUBE OIL DRUM STORAGE AREA
LEGEND
Approximate Site Boundary
Reported Waste Oil Burial Trench
Approximate Extent of Excavation
Confirmation Sample Location
Paved Area
Unlined Earth Swale
N
0
40
80
FEET
SCALE
United States Air Force
March ARB
Site 12
Civil Engineering Yard
Areas Removed During
the Removal Action
Figure
6-3
X:\GIS\A212-14\OU2 AFBCA ROD\SITE_12_DETAIL.DWG 11/17/2000

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**Table 6-13**
**Analytical Results for Organic Compounds in Confirmation Soil Samples**
**Site 12 - Civil Engineering Yard**
**(mg/kg)**

| Analyte | Sample No. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | S035 | S036a | S037 | S038 | S039 | S040 | S041(D) | S042 | RPRGs[1] |
| Phenanthrene | <0.022 | NA | 0.899 | 0.91 | <0.022 | <0.022 | <0.022 | <0.022 | 56[(2)] |
| Fluoranthene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 2300 |
| Pyrene | <0.022 | NA | 0.051 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 2300 |
| Benzo(k)fluoranthene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 6.2(0.61)* |
| Fluorene | <0.022 | NA | 1.4 | 0.678 | <0.022 | <0.022 | <0.022 | <0.022 | 2600 |
| Chrysene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 62(6.1*) |
| Benzo(a)anthracene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 0.62 |
| Benzo(a)pyrene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 0.062 |
| Benzo(b)fluoranthene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 0.62 |
| Indeno(2,3,3-c,d)pyrene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 0.62 |
| 2-Methyl naphthalene | <0.022 | NA | 1.4 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 56[(2)] |
| Benzo(g,h,i)perylene | <0.022 | NA | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 | 56[(2)] |
| 4,4'-DDD | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 2.4 |
| 4,4'-DDE | 0.016 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 1.7 |
| 4,4'-DDT | 0.021 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 1.7 |
| Dieldrin | 0.012 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.03 |
| TRPH | 14 | NA | 7,200 | 3,000 | 15 | 25 | 20 | 19 | NE |
| TPH (D) | <1 | NA | 7,800 | 5,100 | <1 | <1 | <1 | <1 | NE |
| TPH (G) | <1 | NA | 1.2 | 2.7 | 0.1 | <1 | <1 | <1 | NE |
| TPH (J) | <10 | NA | <10 | <10 | <10 | <10 | <10 | <10 | NE |

**Notes:** NA = Not analyzed
NE = Not established
(D) = Diesel
(G) = Gasoline
(J) = Jet Fuel
[1] = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
[2] = Naphthalene used as surrogate
< = Concentration less than listed method detection limit

**Table 6-14**
**Analytical Results for Metals in Confirmation Soil Samples**
**Site 12 - Civil Engineering Yard**
**(mg/kg)**

| Analyte | Sample No. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S022 | S023 | S024 | S025 | S026 | S027 | S028 | S029 | S030 | S031 | S032 | S033 | S034 |
| Cd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| As | 1 | 1.3 | 2 | 3.1 | 1.4 | 1.2 | 1.4 | 1.6 | 1.9 | 2.5 | 1.8 | 1.2 | 2.9 |
| Ba | 67.2 | 97.9 | 116 | 103 | 103 | 94.4 | 93.9 | 103 | 78.4 | 132 | 75.4 | 52.7 | 152 |
| Be | 0.39 | 0.49 | 0.56 | 0.72 | 0.62 | 0.5 | 0.54 | 0.63 | 0.57 | 0.85 | 0.42 | 0.37 | 0.98 |
| Cr | 16.5 | 16.7 | 17.6 | 22.6 | 18.3 | 17.6 | 15.1 | 18.4 | 17.7 | 27.5 | 13.7 | 10.1 | 24.2 |
| Co | 9.2 | 9.7 | 11.6 | 13.1 | 13.3 | 11.1 | 10.1 | 12.2 | 9.1 | 8.6 | 9.5 | 7.4 | 13.3 |
| Cu | 9.5 | 9 | 11.4 | 11.7 | 9.6 | 11.2 | 9.5 | 12.6 | 8.1 | 13.2 | 9.5 | 7.5 | 14.1 |
| Pb | <5 | <5 | <5 | 6.6 | 5.3 | <5 | <5 | 5.5 | 5 | 5.4 | <5 | <5 | 7.4 |
| Ni | 8.8 | 9.8 | 10.5 | 12.5 | 11.9 | 10.4 | 9.5 | 11.8 | 9.8 | 11.4 | 7.9 | 5.7 | 16.1 |
| V | 29.2 | 32 | 38.4 | 48.5 | 40.7 | 34.7 | 33.8 | 40.9 | 36.6 | 53.3 | 31.4 | 24 | 27.3 |
| Zn | 35.2 | 41.2 | 46.3 | 50.8 | 41.3 | 42.8 | 43.2 | 49.9 | 36.6 | 59.1 | 36.6 | 27.3 | 54.9 |
| CrVI | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

| Analyte | Sample No. | | | | | | | | | Maximum Main Base Background Concentrations (all depths) | RPRGs[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | S022 | S035 | S036 | S037 | S038 | S039 | S040 | S041 | S042 | | |
| Cd | <0.5 | 11 | 14 | 18 | 14 | 11 | 20 | 11 | 17 | 1.3 | 37 (9*) |
| As | 1 | 0.8 | 1.1 | 0.95 | 0.75 | 0.51 | 0.72 | 0.74 | 0.75 | 6.5 | 0.39 |
| Ba | 67.2 | 67 | 120 | 91 | 80 | 48 | 110 | 150 | 120 | 916 | 5,400 |
| Be | 0.39 | 0.29 | 0.34 | 0.43 | 0.34 | 0.31 | 0.52 | 0.33 | 0.51 | 1.3 | 150 |
| Cr | 16.5 | 7.4 | 16 | 12 | 8.9 | 6.2 | 11 | 7.2 | 10 | 21 | 210 |
| Co | 9.2 | 7.5 | 9.1 | 9.8 | 8.6 | 5.8 | 8.3 | 6.3 | 10 | 16 | 4,700 |
| Cu | 9.5 | 7.7 | 20 | 13 | 10 | 5.3 | 9.1 | 4.9 | 8.8 | 16.1 | 2,900 |
| Pb | <5 | 7.2 | 71 | 7.1 | 6.1 | 8 | 10 | 6.8 | 8.6 | 40.7 | 400 |
| Ni | 8.8 | 4.6 | <4 | 6.3 | 5.8 | <4 | 6.6 | <4 | 9.1 | 10.3 | 1600 (150*) |
| V | 29.2 | 22 | 27 | 32 | 26 | 21 | 33 | 25 | 33 | 62.8 | 550 |
| Zn | 35.2 | 33 | 69 | 46 | 42 | 24 | 46 | 25 | 44 | 512 | 23,000 |
| CrVI | NA | 0.25 | 0.61 | <0.1 | <0.1 | <0.1 | <0.1 | 1.8 | <0.1 | NE | 30 (0.2*) |

Notes: NA = Not analyzed
< = Less than the listed method detection limit
* = Cal-Modified RPRG
mg/kg = milligrams per kilogram
(1) = RPRGs (Preliminary Remediation Goals), Residential Soil (Set to $10^{-6}$ or HQ of 1), EPA Region IX, 1999.

**Site 17 - Swimming Pool Fill**

The results of the baseline risk assessment based on the contaminants detected in the soil after the removal action indicated carcinogenic risks above the risk range identified in the NCP to future on-site residents and construction workers (Table 6-1, 6-2, and 6-3). The baseline risk assessment reflects the conditions after the removal action since the removal action was conducted (Tetra Tech, Inc. 1994) prior to the completion of the OU2 RI (Tetra Tech, Inc. 1997a). Soil contact and ingestion of PCBs were the major contributor to carcinogenic risks to future residents and future construction workers with risks between $10^{-4}$ and $10^{-6}$. As with all sites at March AFB, groundwater in the area of Site 17 is not currently consumed, and no receptors were identified to be at increased risk from exposure to groundwater. For future on-site residents, increased risk was identified from ingestion and dermal contact with groundwater affected by chloroform. Risks to future residents from chloroform detected in the Site 17 groundwater monitoring wells was between $10^{-4}$ and $10^{-6}$ for carcinogenic risk and less than 1 for non-carcinogenic risks. Based on the basewide groundwater sampling, the chloroform is part of a larger plume within the Main Base area of March Air Force Reserve Base and is not believed to be related to contaminants at Site 17. Additionally, the chloroform levels do not exceed MCLs. Modeling did not show any impact to groundwater from contaminants detected in the soils.

Based on the results of confirmation samples (Table 6-15 and Figure 6-4), the site may pose a threat to human health if soils beneath 8 feet below the ground surface are exposed. The detected concentrations are above residential RPRGs and most exceed the industrial RPRG of 1.0 mg/kg. Remedial alternatives were evaluated to control risks from exposure to the soils below 8 feet. Remedial alternatives are described in Section 7, Description of Alternatives.

**Site 19 - West March Sludge Drying Beds**

The results of the baseline risk assessment indicated carcinogenic and non-carcinogenic risks above the risk range identified in the NCP to future on-site residents, industrial workers, and construction workers (Table 6-1, 6-2, and 6-3). A major contributor to this risk is the hypothetical use of the groundwater as a potable source.

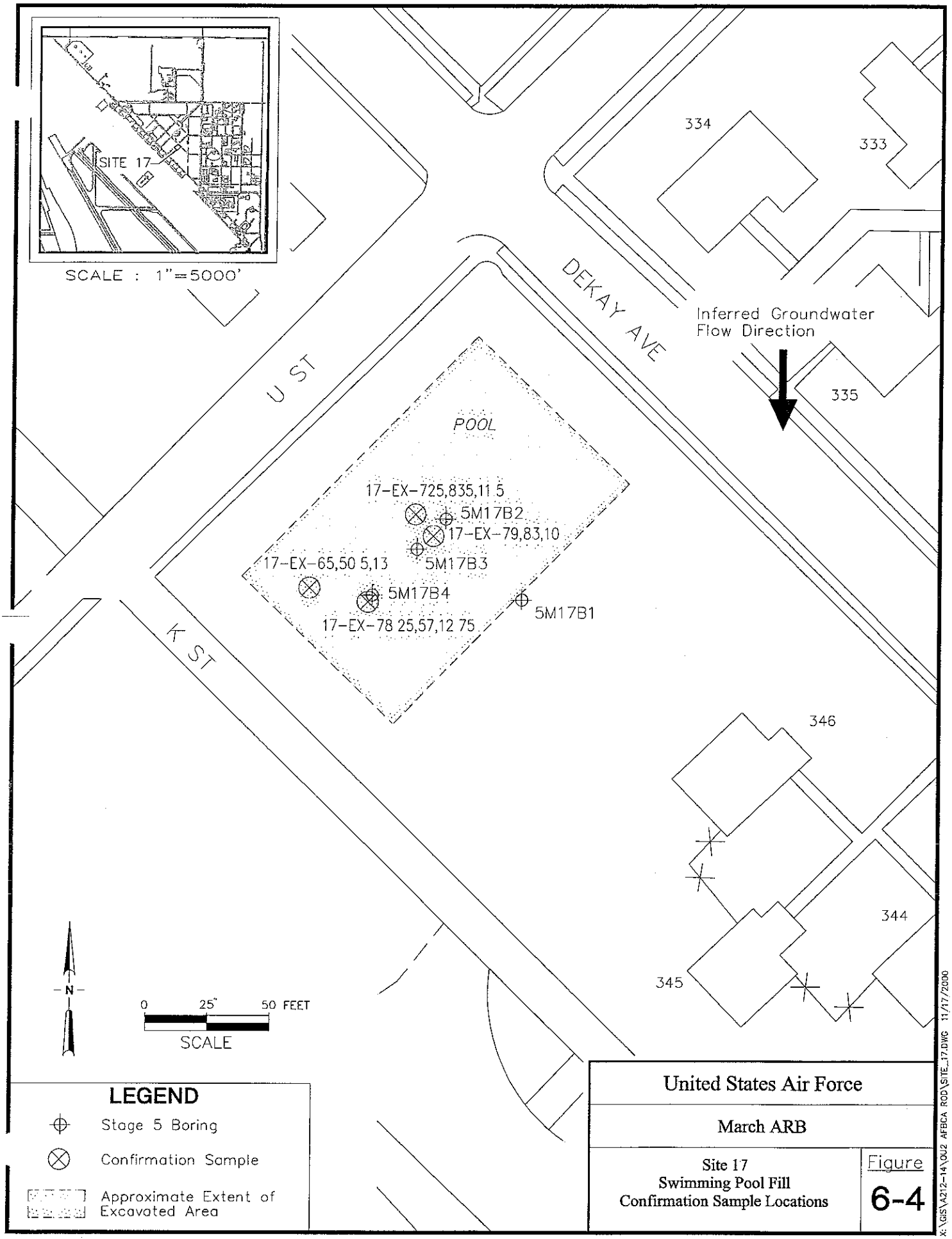
Groundwater in the area of Site 19 is not currently consumed, and no current receptors were identified to be at increased risk from exposure to groundwater. For future on-site residents, risks above the manageable range were identified from the ingestion and dermal contact with groundwater contaminated by arsenic, dieldrin, heptachlor epoxide, and 4-chloroaniline. Further analysis of arsenic under a basewide groundwater monitoring program has shown the levels to be consistent with background levels of arsenic in the area of March AFB. Therefore, the levels of arsenic detected in the groundwater are believed to be indicative of background and not a result of Air Force activities at the site. Additionally, groundwater and bedrock are shallow in this area and the potential for future use of groundwater as a potable source is extremely unlikely.

If the site remains as a sludge drying area, risks to future workers may be overestimated because of assumptions on the frequency and duration of exposures. However, if no remediation were performed, on-site residents could be exposed to risks above the manageable risk range identified in the NCP. Based on the expected use of the site as an industrial area and uncertainties in the risk assessment, industrial risks may be within the manageable range. Remedial alternatives were evaluated to control risks above the NCP range. Remedial alternatives are discussed in Section 7.0, Description of Alternatives.

**Table 6-15**
**Analytical Results for PCBs in Soil Confirmation Samples**
**Site 17 - Swimming Pool Fill**
**(mg/kg)**

| Analyte | Soil Boring/Sample No. | | | | | | | | | | | | | | Residential RPRGs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5M17B1 | | | 5M17B2 | | 5M17B3 | | 5M17B4 | | 17-EX-79,83 | 17-EX-65,50 | 17-EX-64,50,5 | 17-EX-78,25,57 | 17-EX-72,5,83,5 | |
| Depth (feet) | 5 | 10 | 15 | 7.5 | 12.5 | 8.5 | 13.5 | 11.5 | 16.5 | 10 | 13 | 13 | 12.75 | 11.5 | |
| Aroclor 1254 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | 0.021 | <0.012 | <0.012 | <0.012 | 3.8 | 0.8 | <1.1 | 2.8 | 4.4 | 0.22 |
| Aroclor 1260 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | 0.014 | <0.012 | <1.1 | <1.2 | <1.1 | <1.2 | <1.1 | 0.22 |

Notes: < = Analyte not detected followed by the method detection limit.
' = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
Tests performed by EPA Method 8080
mg/kg = milligrams per kilogram


SITE 17
SCALE : 1"=5000'
334
333
335
346
344
345
DEKAY AVE
U ST
K ST
Inferred Groundwater
Flow Direction
POOL
17-EX-725,835,11 5
5M17B2
17-EX-79,83,10
17-EX-65,50 5,13
5M17B3
5M17B4
5M17B1
17-EX-78 25,57,12 75
N
0
25'
50 FEET
SCALE
LEGEND
Stage 5 Boring
Confirmation Sample
Approximate Extent of Excavated Area
United States Air Force
March ARB
Site 17
Swimming Pool Fill
Confirmation Sample Locations
Figure
6-4
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**Site 20 - Landfill No. 7**

The results of the baseline risk assessment for the contaminants detected in the soil, landfilled materials, and groundwater prior to the removal action indicated carcinogenic risks above the range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed as previously described. After completion of excavation activities for the removal action, 13 confirmation samples were taken to confirm that any residual contamination would not pose a risk to human health (Figure 6-5) (IT Corporation 1997f).

Metals concentrations in soil confirmation samples were below RPRGs for all detected metals except arsenic (Table 6-16). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Therefore, potential residual metals in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs and background soil concentrations.

Benzo(b)fluoranthene and benzo(k)fluoranthene were detected in one sample at concentrations less than the RPRG (Table 6-16). Chrysene was not detected during the site investigation but was detected in two confirmation samples at concentrations well below the RPRGs. No other volatile organics, semivolatile organics, organochlorine pesticides, chlorinated herbicides, organophosphorus pesticides, or nitroaromatics/ nitroamines were detected in the confirmation samples. Therefore, potential residual organics in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs.

The removal action at Site 20 has eliminated the potential for migration of contaminants to groundwater.

Based on the results of confirmation samples, the Site 20 no longer poses a threat to human health and no further action is required. Contaminated soil and debris have been removed and confirmation samples confirm that the carcinogenic risk has been reduced to less than $10^{-6}$ for residential receptors.

**Site 22 - Landfill No. 2**

Based on information obtained during the OU2 RI and basewide groundwater sampling programs, there was no evidence of a landfill and/or buried wastes at Site 22. Soil and groundwater sampling did not detect contaminants above background values or from a source such as landfilling activities. Therefore, a baseline risk assessment was not performed and no further action is required.

**Site 23 - East March Effluent Pond**

Based on information obtained during the OU1 RI and basewide groundwater sampling programs, residual contamination attributable to past activities by the Air Force was not detected. Silver may be above background levels in surface soils (the soils backfilled into the pond), but subsurface samples did not show elevated concentrations of silver or any other metal. Pesticides were detected at concentrations typical of Main Base background levels and this area has been used for agricultural purposes. Other detected organic compounds were known common laboratory contaminants Therefore, a baseline risk assessment was not performed and no further action is required.

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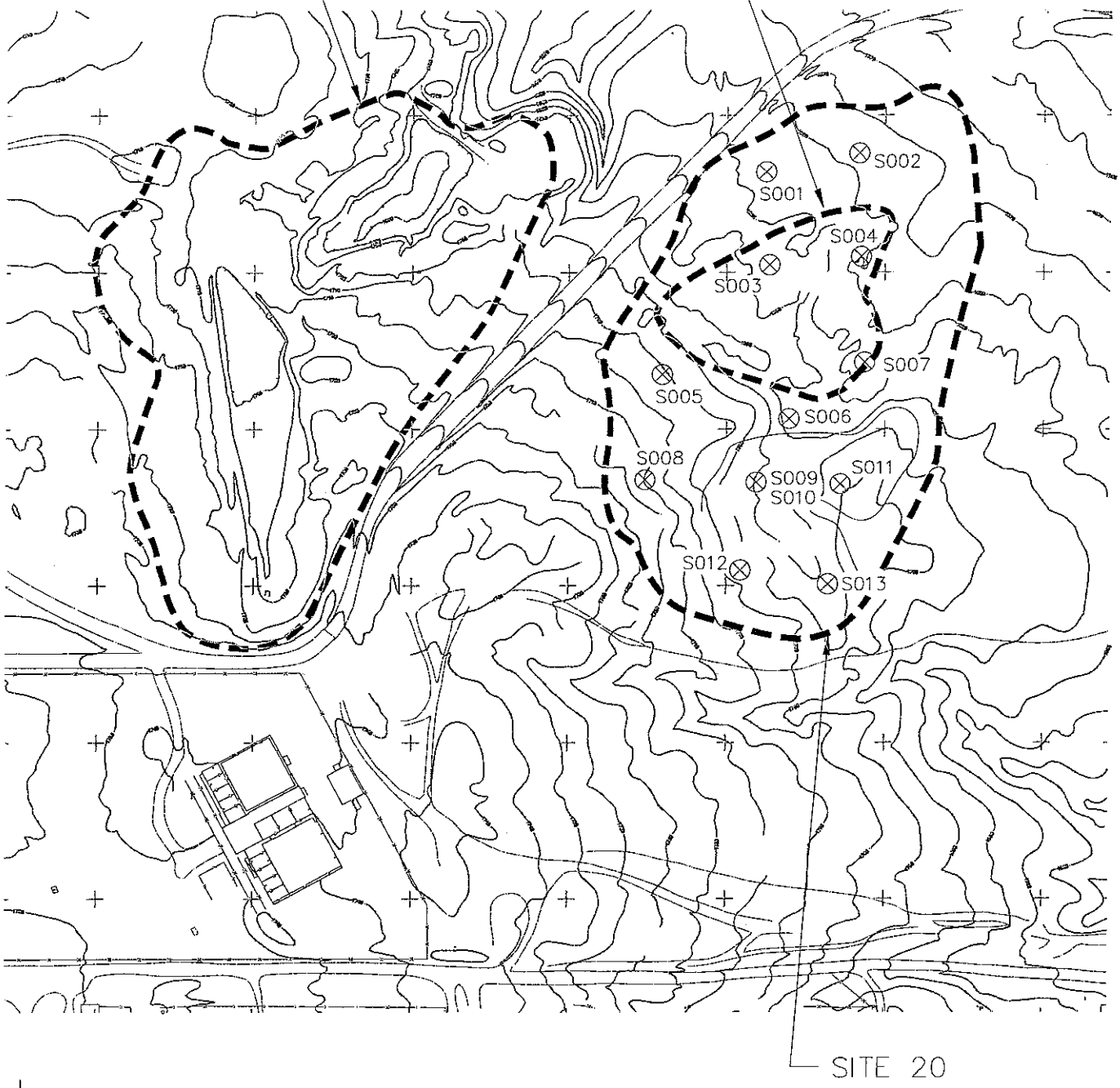


N

**LEGEND**

- Approximate Site Boundary
- ⊗ Confirmation Sample

0 100 200 FEET

SCALE

CONTOUR INTERVAL=5 FEET

| United States Air Force | | |
|---|---|---|
| March ARB | | |
| Site 20/26<br>Confirmation Sample Locations | Figure | 6-5 |

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**Table 6-16**
**Analytical Results for Metals and PAHs in Soil Confirmation Samples**
**Site 20 - Landfill No. 7**
**(mg/kg)**

| Analyte | Method | Sample No. | | | | | | | | | | | | | Average Confirmation Sample Concentration | Maximum West March Background Concentration (all depths) | RPRGs[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S001 | S002 | S003 | S004 | S005 | S006 | S007 | S008 | S009 | S010 | S011 | S012 | S013 | | | |
| As | 7060 | 1.2 | 1.2 | ' | 0.91 | ' | 0.84 | 1.2 | ' | 1.2 | 0.8 | 1.4 | 0.94 | 0.8 | 1.04 | 5.28 | 0.39 |
| Ba | 6010 | 494 | 285 | 627 | 859 | 670 | 526 | 504 | 553 | 452 | 345 | 531 | 429 | 104 | 452 | 552 | 5400 |
| Be | 6010 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | 0.2 | 0.14 | <0.14 | <0.14 | 0.21 | 0.1 | 10.9 | 150 |
| Cr | 6010 | 20.6 | 14.7 | 26.2 | 22.3 | 29.4 | 21.3 | 24.7 | 18.8 | 24.2 | 19.2 | 31.2 | 18.4 | 2.3 | 21 | 29.1 | 210 |
| Co | 6010 | 17.3 | 14 | 22.8 | 19.3 | 26 | 17.4 | 17.8 | 16.7 | 20.8 | 16.1 | 20.1 | 18.4 | 3.7 | 17.7 | 16.1 | 4700 |
| Cu | 6010 | 5 | 20.9 | 11.9 | 10.3 | 5.8 | 6.5 | 12.5 | 9.9 | 8.9 | 8.7 | 8.7 | 4.9 | 2.2 | 8.9 | 17 | 2900 |
| None identified | 6010 | 7.1 | 4.9 | 9.2 | 7.7 | 10.2 | 7.1 | 6.8 | 6.3 | 8.5 | 6.6 | 10 | 6.8 | 2 | 7.2 | 10.4 | 1600 (150*) |
| V | 6010 | 60.7 | 47.2 | 80.5 | 67.1 | 94.8 | 58.8 | 66.2 | 62.4 | 76.1 | 58.4 | 64 | 60.9 | 14.2 | 62.4 | 75.4 | 550 |
| Zn | 6010 | 53.1 | 36.8 | 72 | 53.7 | 78.5 | 52.7 | 56.4 | 52.2 | 76.4 | 58 | 58.1 | 52.9 | 33.8 | 56.5 | 413 | 23,000 |
| Chrysene | 8270 | <0.04 | 0.061 | <0.04 | 0.75 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | 0.08 | | 62 (6.1*) |
| Benzo(b)fluoroanthene | 8270 | <0.004 | 0.005 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | 0.002 | | 0.62 |
| Benzo(k)fluoroanthene | 8270 | <0.004 | 0.005 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | 0.002 | | 6.2 (0.61*) |

Notes: < = Analyte not detected followed by the method detection limit.
' = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
* = Cal-modified RPRG
mg/kg = milligrams per kilogram

**Site 24 - Landfill No. 1**

The results of the baseline risk assessment for the contaminants detected in the soil, landfilled materials, and groundwater prior to the removal action indicated carcinogenic and non-carcinogenic risks above the range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed as previously described. After completion of excavation activities for the removal action, confirmation samples were taken to confirm that any residual contamination would not pose a risk to human health (Figure 6-6) (IT Corporation 1997g).

No volatile organics, semivolatile organics, organochlorine pesticides, chlorinated herbicides, PCBs, PAHs, organophosphorus pesticides, or nitroaromatics/nitroamines were detected in the confirmation samples. Two confirmation samples had low levels of total recoverable petroleum hydrocarbons (to 37 mg/kg). Therefore, potential residual organics in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs.

Metals concentrations in soil confirmation samples were below RPRGs for all detected metals except arsenic (Table 6-17). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Therefore, potential residual metals in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs and background soil concentrations. The removal action at Site 24 has eliminated the potential for migration of contaminants to groundwater.

Based on the results of confirmation samples, the Site 24 no longer poses a threat above the range identified in the NCP to human health and no further action is required. Contaminated soil and debris have been removed and confirmation samples confirm that the carcinogenic and non-carcinogenic risk has been reduced to less than $10^{-6}$ and 1, respectively, for residential receptors.

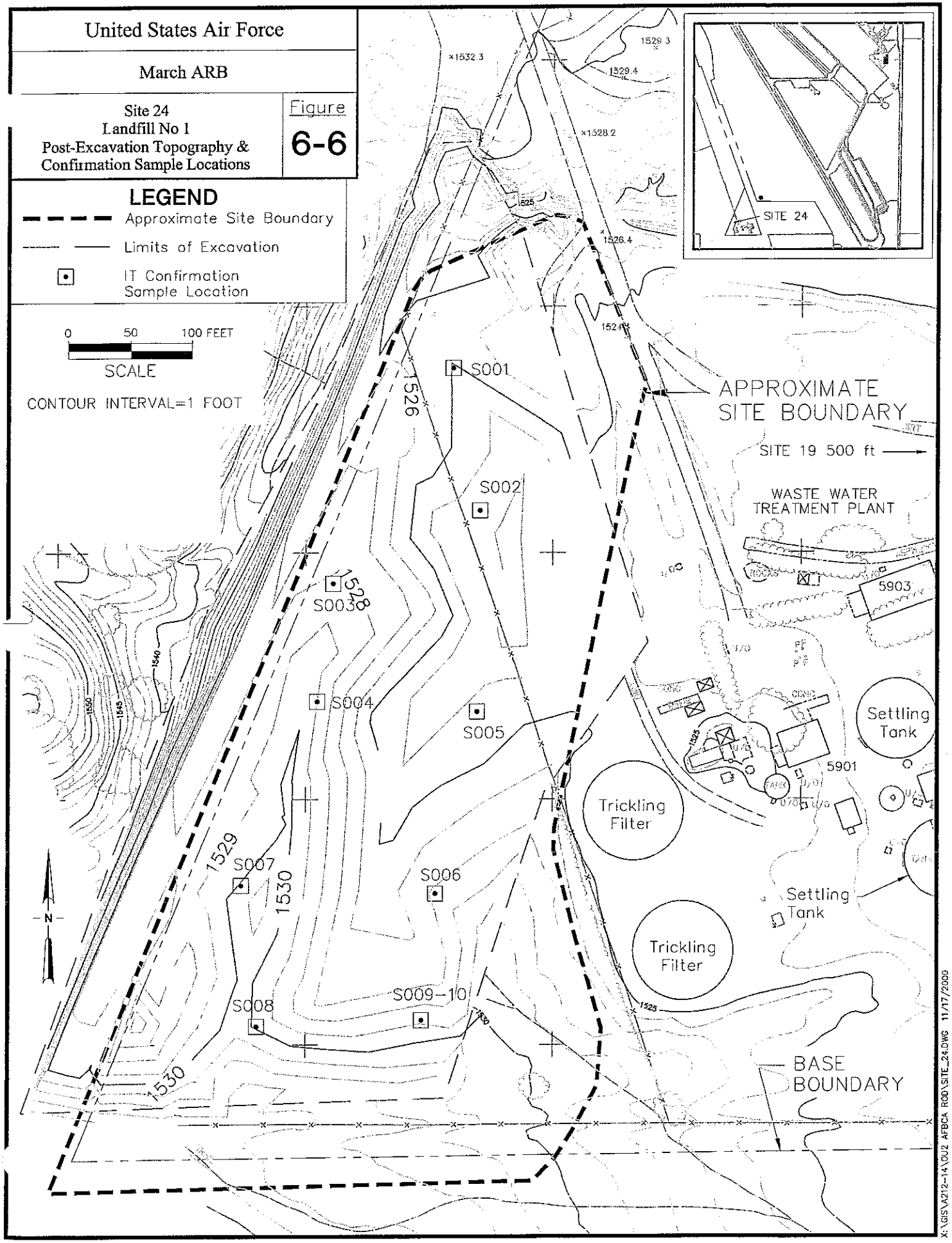
United States Air Force
March ARB
Site 24
Landfill No 1
Post-Excavation Topography &
Confirmation Sample Locations
Figure
6-6
LEGEND
Approximate Site Boundary
Limits of Excavation
IT Confirmation
Sample Location
0 50 100 FEET
SCALE
CONTOUR INTERVAL=1 FOOT
SITE 24
S001
S002
S003
S004
S005
S006
S007
S008
S009-10
APPROXIMATE
SITE BOUNDARY
SITE 19 500 ft
WASTE WATER
TREATMENT PLANT
5903
5901
Settling
Tank
Trickling
Filter
Settling
Tank
Trickling
Filter
BASE
BOUNDARY
1526
1528
1529
1530
1525
1526.4
1524
1532.3
1529.4
1528.2
1529.3
1540
1550
1545
N
X:\GIS\A212-14\OU2 AFBCA ROD\SITE_24.DWG 11/17/2000

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**Table 6-17**
**Analytical Results for Metals Detected in Confirmation Soil Samples**
**Site 24 - Landfill No.1**
**(mg/kg)**

| Analyte | Method | Sample No. | | | | | | | | | | Average Confirmation Sample Concentration | Maximum West March Background Concentration | RPRGs[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S001 | S002 | S003 | S004 | S005 | S006 | S007 | S008 | S009 | S010 | | | |
| As | 7060 | 1.8 | 0.88 | 1.2 | 1.8 | 1.8 | 1.6 | 1.8 | 1.3 | 2 | 2 | 1.618 | 5.28 | 0.39 |
| Hg | 7471 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.11 | <0.10 | <0.10 | <0.10 | <0.10 | 0.056 | 0.08 | 23 |
| Ba | 6010 | 207 | 425 | 395 | 157 | 248 | 144 | 160 | 203 | 230 | 242 | 241.1 | 552 | 5400 |
| Be | 6010 | 0.32 | 0.19 | 0.19 | 0.3 | 0.18 | 0.28 | 0.3 | 0.28 | 0.4 | 0.38 | 0.282 | 10.9 | 150 |
| Cr | 6010 | 16.9 | 25.8 | 19.9 | 16.6 | 21 | 14.8 | 15.9 | 16.6 | 22.7 | 21.6 | 19.18 | 29.1 | 210 |
| Co | 6010 | 10.5 | 21.2 | 13.5 | 10.9 | 17.5 | 8.9 | 10 | 11.4 | 15 | 14.3 | 13.32 | 16.1 | 4700 |
| Cu | 6010 | 14.7 | 36.3 | 45.3 | 11.2 | 18.6 | 10.8 | 10.8 | 12.6 | 17.6 | 16.2 | 19.41 | 17 | 2900 |
| Pb | 6010 | <5.0 | <5.0 | <5.0 | <5.0 | 6 | 7.4 | <5.0 | 5.3 | <5.0 | 5.2 | 3.89 | 17.2 | 400 |
| Ni | 6010 | 7.7 | 8.4 | 6.8 | 7.6 | 8.5 | 9.3 | 6.5 | 7.5 | 10.5 | 10.1 | 8.29 | 10.4 | 1600 (150*) |
| V | 6010 | 41.8 | 74.7 | 52 | 38.5 | 63.5 | 37.2 | 42.2 | 40.6 | 56.7 | 53.2 | 50.04 | 75.4 | 550 |
| Zn | 6010 | 35.1 | 59.1 | 39.5 | 37.5 | 60.2 | 37.4 | 32.4 | 41.3 | 52.5 | 51.9 | 44.69 | 413 | 23,000 |

Notes: < = Analyte not detected above the indicated reporting limit.
For the purpose of calculating mean concentrations, non-detects are considered equal to 1/2 the reporting limit.
* = Cal-modified RPRG.
[1] = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
mg/kg = milligrams per kilogram

**Site 25 - Munitions Residue Burial Site**

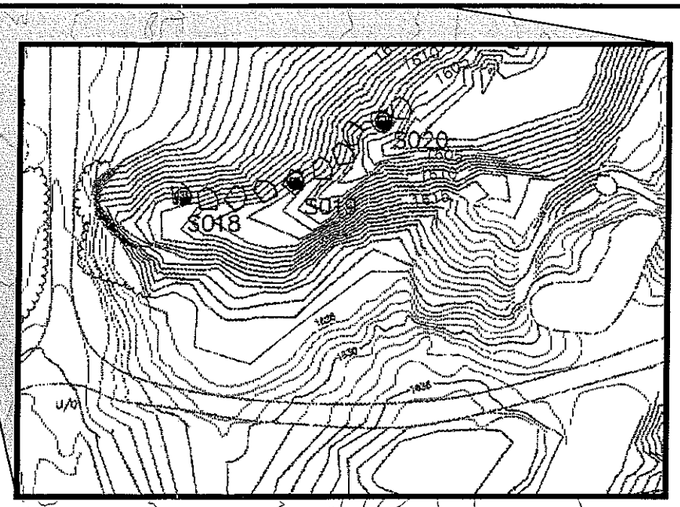
The results of the baseline risk assessment for the contaminants detected in the soil, buried materials, and groundwater at Site 25 prior to the removal action indicated carcinogenic risks above the range identified in the NCP to future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed as previously described. Additionally, the removal action mitigated physical hazards that are not considered in the baseline risk assessment that could arise from undetonated munitions that might have been buried in the disposal trenches. After completion of excavation activities for the removal action, 13 confirmation samples were taken to confirm that any residual contamination would not pose a risk to human health (Figure 6-7) (IT Corporation 1997h).

The sampling showed residual dioxins, 4,4'-DDT, and 4,4'-DDE in soils (Table 6-18). Based on the toxicity equivalency factors (TEFs) shown in Table 6-18, the dioxin TCDD equivalent concentration for the sample with the maximum concentrations of dioxins and furans is $2 \times 10^{-6}$ mg/kg, less than the RPRG of $3.9 \times 10^{-6}$ mg/kg. The detected 4,4'- DDT and 4,4'-DDE are orders of magnitude less than their RPRGs. No additional volatile organic compounds, semivolatile organic compounds, chlorinated herbicides, PCBs, PAHs, organophosphorus pesticides, or nitroaromatics/nitroamines were detected in the confirmation samples. Therefore, potential residual organic compounds in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs.

Metals concentrations in soil confirmation samples were below RPRGs for all detected metals except arsenic (Table 6-19). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Therefore, potential residual metals in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs and background soil concentrations.

Groundwater sampling conducted at Site 25 after the removal action has shown no detectable concentrations of the contaminants that were previously detected. The removal action at Site 25 has eliminated the potential for migration of contaminants to groundwater.

Based on the results of confirmation samples, the Site 25 no longer poses a threat to human health above the range identified in the NCP and no further action is required. Contaminated soil and munitions residues have been removed and confirmation samples confirm that the carcinogenic and non-carcinogenic risk has been reduced to less than $10^{-6}$ and 1, respectively, for residential receptors




SAMPLES LOCATED APPROXIMATELY 200' NORTH

Detonation Crater

Burn Pit

S001
S003
S004
S005/S006

DIG SITE 3

DIG SITE 2

S002
S009
S007
S008
S010

Major Burial Pit

DIG SITE 1

S014
S011
S013
S015
S017
S012
S016

Disposal Trenches

Drag Deposition Area

APPROXIMATE SITE BOUNDARY

BASE BOUNDARY

N

0 100 200 FEET

SCALE

**LEGEND**

Site Boundary

Confirmation Sample

United States Air Force

March ARB

Site 25
Munitions Residue
Burial Site
Removal Action Dig Sites

Figure 6-7

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**Table 6-18**
**Analytical Results for Dioxins and Furans Detected in Confirmation Soil Samples**
**Site 25 – Munition Residue Burial Area**
**(mg/kg)**

| Analyte | Sample No. | | | | | | | | | | | | | | | | RPRGs[1] | TEF[2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S003 | S004 | S005 | S006 | S007 | S008 | S009 | S010 | S013 | S014 | S015 | S016 | S017 | S018 | S019 | S020 | | |
| HpCDFs | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | 8.8E-06 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | <5E-07 | | |
| TCDFs (total) | <8E-06 | 1.2E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | | |
| OCDF | <8E-06 | 1.1E-05 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | 1.5E-05 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | <8E-06 | | 0.001 |
| HxCDDs (total) | <2.7E-06 | 6.1E-07 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | <2.7E-06 | | |
| HpCDDs (total) | <9E-07 | 5.4E-05 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | 3.6E-05 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | <9E-07 | | |
| 1,2,3,4,6,7,8-HpCDD | <2.6E-06 | 3E-05 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | 1.4E-05 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | <2.6E-06 | | 0.01 |
| OCDD | 2.9E-05 | 2.2E-04 | <1.3E-06 | <1.3E-06 | <1.3E-06 | 2E-05 | 8.7E-05 | <1.3E-06 | <1.3E-06 | 6E-05 | <1.3E-06 | <1.3E-06 | 1.5E-05 | 4.1E-05 | <1.3E-06 | <1.3E-06 | | 0.001 |
| 4,4'-DDE | 1.7E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | 1.7 | |
| 4,4'-DDT | 3.5E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | <3E-03 | 1.7 | |

Notes: < = Analyte not detected above the indicated reporting limit.
' = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
' = TEF (Toxicity Equivalency Factor)
mg/kg = milligrams per kilogram

**Table 6-19**
**Organic Chemicals Concentrations in Confirmation Samples**
**Site 25 Munition Residue Burial Area**
**(mg/kg)**

| Analyte | Sample No. | | | | | | | | | | | | | | | | Maximum West March Background Concentrations (all depths) | RPRGs[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S003 | S004 | S005 | S006 | S007 | S008 | S009 | S010 | S013 | S014 | S015 | S016 | S017 | S018 | S019 | S020 | | |
| As | 1.2 | 1.1 | 1 | 1.4 | 1.4 | 1.1 | 2.1 | 1.4 | 1.5 | 0.87 | 0.96 | 1.7 | 1.9 | 0.72 | 0.78 | 1.4 | 5.26 | 0.39 |
| Ba | 175 | 452 | 137 | 271 | 174 | 344 | 530 | 308 | 147 | 218 | 252 | 195 | 178 | 257 | 188 | 212 | 552 | 5400 |
| Be | 0.23 | 0.25 | ND | 0.23 | 0.22 | 0.22 | 0.37 | 0.34 | 0.32 | ND | 0.23 | 0.43 | 0.37 | ND | 0.14 | 0.14 | 10.95 | 150 |
| Cd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 37 (9.0*) |
| Cr | 13.3 | 22.8 | 9 | 17 | 13 | 18.7 | 19.6 | 17.1 | 17.5 | 15.4 | 18 | 19.1 | 18.2 | 18.8 | 13.8 | 15.9 | 29.1 | 210 |
| Co | 8.6 | 10.5 | 6.2 | 12.2 | 8.4 | 12.9 | 11.3 | 9.1 | 10.3 | 12.7 | 13.9 | 11.9 | 11.1 | 11.9 | 9.2 | 11.4 | 16.1 | 4700 |
| Pb | 9.4 | 14.4 | <5.0 | 15.6 | <5.0 | <5.0 | <5.0 | 30.6 | <5.0 | <5.0 | <5.0 | <5.0 | 5.3 | <5.0 | <5.0 | <5.0 | 17.2 | 400 |
| Mo | <2.0 | 17.7 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | 11.2 | 390 |
| Ni | 5.6 | 6.1 | ND | 6.9 | 5.9 | 7.9 | 7.6 | 5.8 | 7.1 | 4.2 | 5.8 | 8.7 | 8.4 | 7.5 | 4.5 | 5.1 | 10.4 | 1600 (150*) |
| V | 30.7 | 36.1 | 20.5 | 41.3 | 33.7 | 51.7 | 48.8 | 36.7 | 40.7 | 42.3 | 51 | 47.1 | 44 | 38.9 | 38.5 | 46.8 | 75.4 | 550 |
| Zn | 44.3 | 64.6 | 18.2 | 59.2 | 33.6 | 116 | 40.4 | 135 | 38.2 | 38.9 | 48.6 | 43.3 | 41.8 | 35.8 | 32.3 | 37.8 | 413 | 23,000 |

Notes: 1 = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
* = Cal-modified RPRG
< = Concentration less than the listed method detection limit.
mg/kg = milligrams per kilogram

**Site 26 - Water Treatment Plant Sludge**

The baseline risk assessment was performed for Site 26a and Site26b. The results of the baseline risk assessment for the contaminants detected in the lime sludge and groundwater prior to the removal action indicated carcinogenic and non-carcinogenic risks above the range identified in the NCP to future industrial workers, future construction workers and future on-site residents (Table 6-1, 6-2, and 6-3). To mitigate these risks and protect groundwater, a removal action was performed. The removal action at Site 26a excavated all visible lime sludge to bedrock and Site 26b (i.e., lime sludge over Site 20 wastes were removed) (IT Corporation 1996, 1997f and 1997i). Therefore, no residual affected soils or sludge remain at either Site 26a or Site 26b, eliminating the exposure pathway. Since all soil and sludge to bedrock was excavated, no confirmation samples were taken at Site 26a after the removal action. Site 26b was located on top of the landfilled material of Site 20. Therefore, confirmation sampling at Site 20 is indicative of post-removal action conditions at Site 26b. Groundwater samples taken since the RI have indicated that the previously detected arsenic is indicative of background concentrations (Tetra Tech, Inc. 1997b). The area was backfilled with clean soil and no further action is required.

**Site 30 - Construction Rubble Burial Site**

The results of the baseline risk assessment for the contaminants detected in the soil prior to the trash and debris removal indicated carcinogenic or non-carcinogenic risk within the acceptable range identified in the NCP to future industrial workers, future construction workers or future on-site residents (Table 6-1, 6-2, and 6-3). For soils, carcinogenic health risks were less than $10^{-6}$ and non-carcinogenic health risks were less than 1.

Risks from arsenic to future residents from usage of groundwater and swimming in surface water were within the manageable risk range. No non-carcinogenic risks were greater than 1 from groundwater usage at Site 30. Further analysis of arsenic in groundwater under a basewide groundwater monitoring program has shown the levels to be consistent with background levels in the area of March AFB. Therefore, the levels of arsenic detected in the groundwater and surface water, since the pond is fed by groundwater, are believed to be indicative of background and not a result of Air Force activities at the site. Additionally, groundwater and bedrock are shallow in this area and the potential for future use of groundwater as a potable source is extremely unlikely. No contaminants modeled to migrate to groundwater showed risks above the range identified in the NCP.

As previously discussed, Site 30 has been used for illegal dumping. The Air Force has removed accumulated trash and debris from the site.

Based on the results of investigations and analyses performed during the OU2 RI and basewide groundwater investigations, the site poses no threat to human health and no further action is required.

**Site 35 - 15th Air Force Headquarters Leaking Underground Storage Tanks**

The results of the baseline risk assessment for the contaminants detected in the soil and groundwater indicated no carcinogenic or non-carcinogenic risks above the range identified in the NCP to future industrial workers, future construction workers or future on-site residents (Table 6-1, 6-2, and 6-3). Carcinogenic health risks were less than $10^{-6}$ and non-carcinogenic health risks were less than 1 for all receptors. Human health risk levels from groundwater usage were within the range identified in the NCP.

However, long-chain petroleum hydrocarbons were detected in soils at Site 35c. These petroleum hydrocarbon contaminants could potentially degrade water quality at the site. To mitigate this concern, the Air Force installed and operated a bioventing system at Site 35c. Upon completion of bioventing, the soils were sampled and hydrocarbon concentrations had decreased to manageable levels allowing for regulatory closure of the petroleum hydrocarbon concern at Site 35c. No further action is required for Site 35.

**Site 40 - Landfill No. 8**

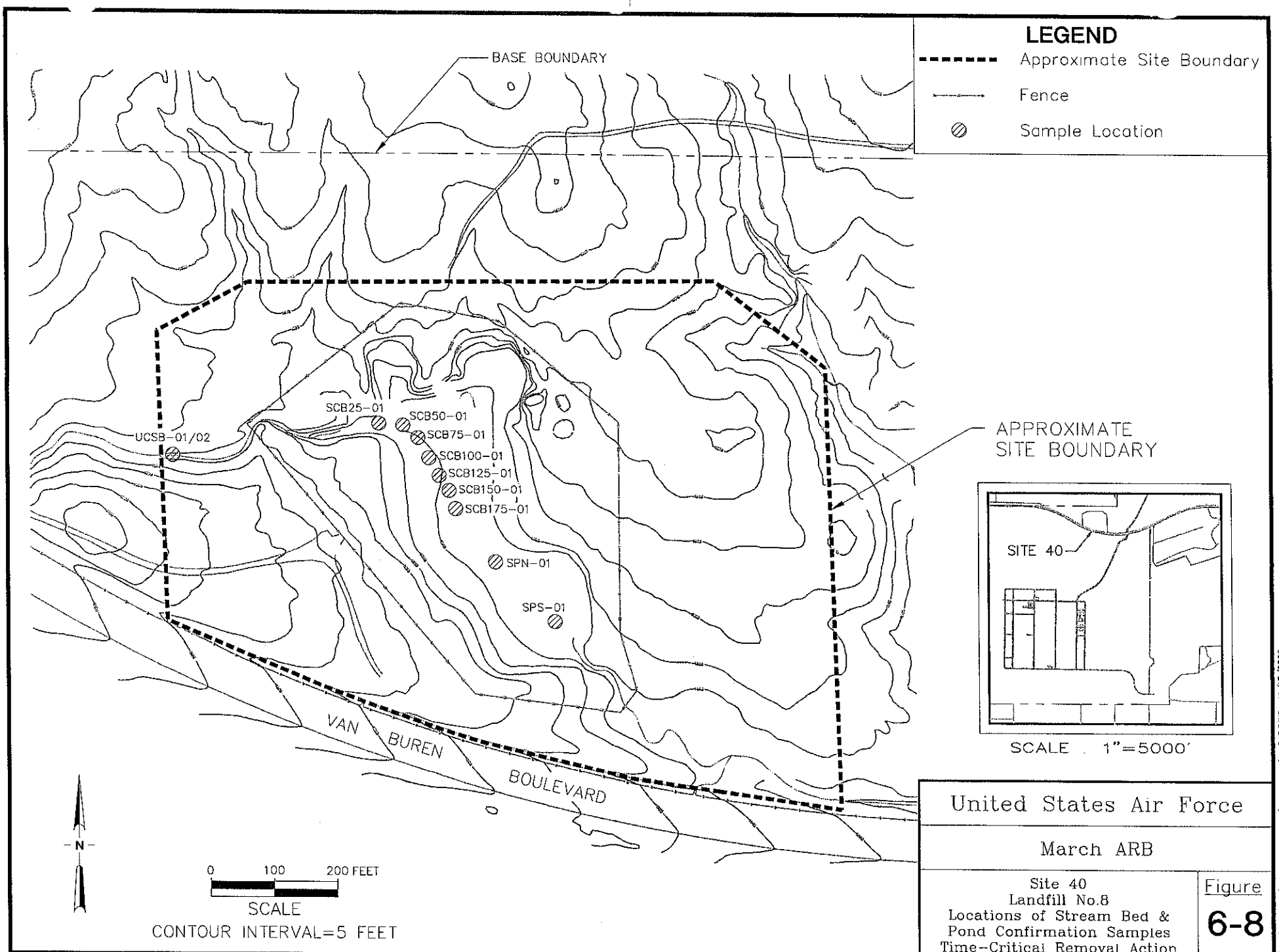
A quantitative baseline risk assessment was not conducted at Site 40 because the removal action was being performed at the time of the RI. The removal action was performed to mitigate concerns regarding drums exposed in a drainage by erosion. After completion of excavation activities for the removal action, confirmation samples were taken to confirm that any residual contamination would not pose a risk to human health. (Figures 6-8 and 6-9) (OHM Remediation Services Corporation 1995)

The sampling showed residual volatile organics, organochlorine pesticides and petroleum hydrocarbons in soils and sediments (Table 6-20). The concentrations of detected organics were less than their respective RPRGs, usually by several orders of magnitude. No other volatile organics, semivolatile organics, organochlorine pesticides, or PCBs were detected in the confirmation samples. Therefore, potential residual organic compounds in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs. Metals concentrations in soil and sediment samples were below RPRGs for all detected metals except arsenic (Table 6-21). Most metals concentrations are orders of magnitude below their respective RPRGs. Arsenic exceeds the RPRG, but is within the range of background for arsenic in soils for the OU2 West March Base as documented in the OU2 RI. Therefore, potential residual metals in soils after the removal action do not pose a risk above the range identified in the NCP to residential receptors based on RPRGs and background soil concentrations.

Metals concentrations in surface water samples were below RPRGs for all detected metals except arsenic and antimony (Table 6-22). Most metals concentrations are orders of magnitude below their respective RPRGs. However, arsenic exceeds the RPRG but is less than the MCL. Antimony exceeds both the RPRG and MCL. Additionally, the concentration of antimony is uncertain because the test methodology at the time of the RI caused overestimation of antimony concentrations due to interferences from several metals including aluminum and vanadium. It is very unlikely that pond water would be used as a potable source. Therefore, there are limited risks related to human receptors for surface water at Site 40.

No contamination has been detected in groundwater at Site 40.

Based on the results of confirmation samples, Site 40 no longer poses a risk above the range identified in the NCP to human health and no further action is required. Contaminated soil and debris have been removed and confirmation samples confirm that the risk has been reduced to less than $10^{-6}$ for residential receptors.


LEGEND
Approximate Site Boundary
Fence
Sample Location
BASE BOUNDARY
SCB25-01
SCB50-01
SCB75-01
SCB100-01
SCB125-01
SCB150-01
SCB175-01
UCSB-01/02
SPN-01
SPS-01
APPROXIMATE SITE BOUNDARY
SITE 40
SCALE 1"=5000'
VAN BUREN BOULEVARD
N
0 100 200 FEET
SCALE
CONTOUR INTERVAL=5 FEET
United States Air Force
March ARB
Site 40
Landfill No.8
Locations of Stream Bed & Pond Confirmation Samples
Time-Critical Removal Action
Figure
6-8
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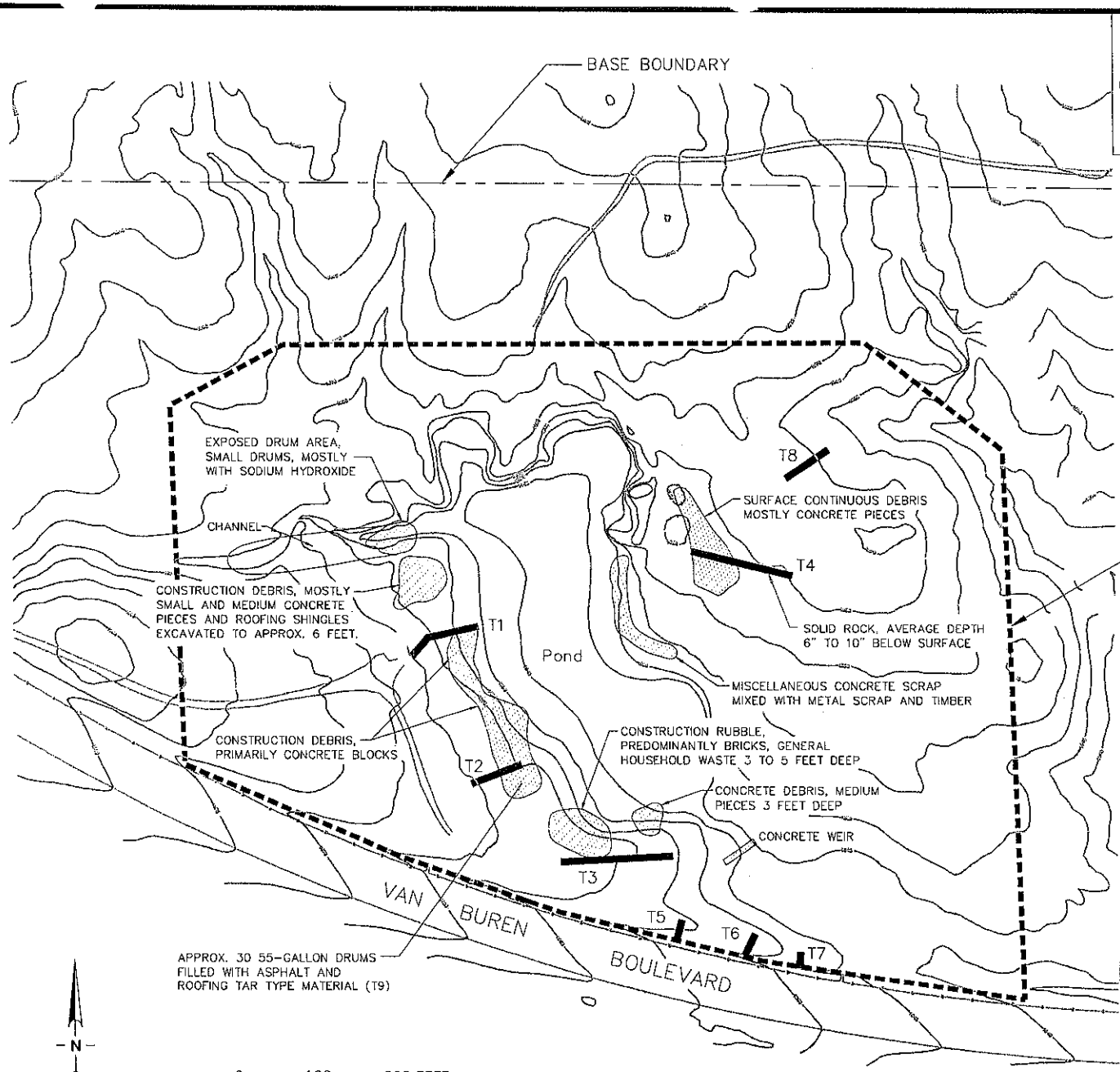
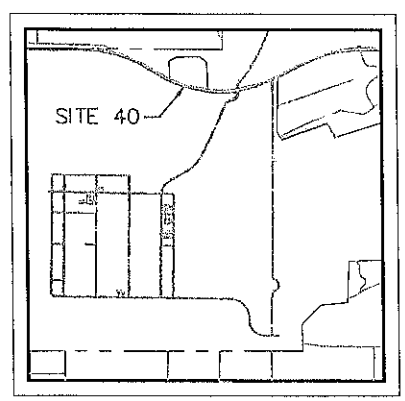



## LEGEND

Trench (Removal Action)

NOTES:
1. All noted debris and waste were removed from Site 40 during the Time-Critical Removal Action.

2. See Table 6-21 for description of sample locations in trenches.




United States Air Force

March ARB

Site 40
Landfill No.8
Trench Locations
Time-Critical Removal Action

Figure 6-9

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**Table 6-20**
**Organic Compounds in Creek and Pond Confirmation Samples (Soil and Sediment)**
**Site 40 – Landfill No. 8**
**(mg/kg)**

| Analyte | Method | Sample No. and Location | | | | | | | | | | | | | | | | RPRGs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CBS-A-01 Creek NE bank | CBS-B-01 Creek SE bank | CBS-C-01 Creek NW bank | CBS-D-01 Creek SW bank | CBS-E-01 Creek SW bank | USCB-01 Upstream | USCB-02 Upstream | SCB25-01 Pond | SCB50-01 Pond | SCB75-01 Pond | SCB100-01 Pond | SCB125-01 Pond | SCB150-01 Pond | SCB175-01 Pond | SPN-01 Pond | SPS-01 Pond | |
| Benzene | 8240 | <0.01 | 0.00215 | 0.00212 | 0.00155 | <0.011 | 0.013 | <0.012 | <0.012 | NA | NA | NA | NA | NA | NA | <0.019 | | 0.67 |
| Toluene | 8240 | <0.01 | 0.00561 | <0.011 | <0.011 | <0.011 | 0.013 | <0.012 | <0.012 | NA | NA | NA | NA | NA | NA | <0.019 | | 520 |
| 4,4'-DDT | 8080 | 0.00108 | 0.0086 | <0.0037 | <0.0036 | <0.0036 | <0.0041 | <0.0039 | 0.079 | NA | <0.0039 | NA | <0.0043 | NA | <0.0048 | 0.0046 | <0.007 | 1.7 |
| 4,4'-DDE | 8080 | <0.0033 | 0.00189 | <0.0037 | <0.0036 | <0.0036 | <0.0041 | <0.0039 | <0.0041 | NA | <0.0039 | NA | <0.0043 | NA | <0.0048 | 0.0031 | <0.007 | 1.7 |
| MEK | 8080 | <0.01 | <0.01 | <0.011 | <0.011 | <0.011 | <0.013 | <0.012 | <0.012 | NA | NA | NA | NA | NA | NA | 0.026 | | 7,300 |
| TRPH | 8015M | 13.4 | 8.3 | 11 | 7.2 | 10.8 | 71.3 | 101 | 46.6 | 21.5 | 25 | 68.7 | 57.8 | 25.5 | 66 | 33.3 | 11.2 | |

Notes: [1] = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999.
< = Concentration less than the listed method detection limit.
NA = Not Analyzed
mg/kg = milligrams per kilogram

**Table 6-21**
**Metals Concentrations in Confirmation Samples (Soil and Sediment)**
**Site 40 - Landfill No. 8**
**(mg/kg)**

| Analyte | Trench Soil Sample No. and Location | | | | | | |
|---|---|---|---|---|---|---|---|
| | T1-S-1-01 Trench 1, Pile A | T1-S-1-01 Trench 1, Pile B | T2-S-1-01 Trench 2, North End | T2-S-2-01 Trench 2 South End | T2-S-3-01 Trench 2 Middle | T3-S-1-01 Trench 3 North End | T3-S-2-01 Trench 3 South End |
| Ag | <0.2 | <0.23 | <0.21 | <0.2 | <0.2 | <0.21 | <0.21 |
| As | 1.5 | 1 | 2.1 | 1.4 | 1.3 | 1.3 | 1 |
| Ba | 270 | 442 | 185 | 194 | 400 | 187 | 186 |
| Be | 0.73 | <0.23 | 0.74 | 0.58 | 0.34 | 0.82 | 0.68 |
| Cd | 1.7 | <0.68 | <0.62 | <0.61 | <0.61 | 3.8 | 1.6 |
| Cr | 17.1 | 20.9 | 18.6 | 16.6 | 16.3 | 17.1 | 16.6 |
| Co | 14.9 | 20.6 | 14.8 | 14 | 17.2 | 14.3 | 13.8 |
| Cu | 16 | 18.2 | 15.4 | 13.5 | 17.1 | 17.3 | 17.7 |
| Hg | 0.1 | 0.11 | 0.1 | 0.1 | 0.1 | 0.15 | 0.16 |
| Ni | 5.3 | 6.7 | 11.4 | 7.6 | 6.8 | 11.4 | 15.5 |
| Pb | 18.4 | 2.5 | 7.4 | 4.7 | 3.4 | 28.3 | 20.9 |
| Sb | 6.3 | 5 | <4.1 | 6.9 | 9.1 | 4.7 | 6.3 |
| Se | 0.61 | 0.61 | 0.49 | 0.43 | 0.45 | 0.66 | 0.57 |
| Tl | 0.36 | 0.3 | 0.33 | 0.31 | 0.51 | 0.21 | 0.36 |
| V | 52.9 | 76.4 | 52.1 | 52.2 | 61.2 | 55.8 | 58.5 |
| Zn | 59.6 | 67.2 | 54.8 | 50 | 55.8 | 69.4 | 71.6 |

Table 6-21 (Cont. page 2)

| Analyte | Trench Soil Sample No. and Location (Cont.) | | | | | | |
|---|---|---|---|---|---|---|---|
| | T4-S-1-01 Trench 4 | T5-S-1-01 Trench 5 | T6-S-1-01 Trench 6 | T6-S-1-01 Trench 6 | T7-S-1-01 Trench 7 | T8-S-1-01 Trench 8 North End | T8-S-2-01 Trench 8 North End |
| Ag | <0.2 | 0.29 | <0.21 | <0.2 | <0.2 | <0.21 | <0.21 |
| As | 0.71 | 1.4 | 3 | 0.99 | 1.1 | 1.6 | 1.1 |
| Ba | 193 | 284 | 452 | 323 | 298 | 495 | 421 |
| Be | 0.34 | 0.49 | 0.34 | 0.33 | 0.33 | 0.34 | 0.34 |
| Cd | 1.6 | <0.61 | <0.62 | <0.6 | <0.6 | <0.62 | <0.62 |
| Cr | 12.5 | 18.8 | 16.7 | 17.6 | 15.8 | 15.9 | 17.4 |
| Co | 11.3 | 17.6 | 13.8 | 16.7 | 15 | 17.5 | 15.9 |
| Cu | 13.9 | 34.2 | 39.5 | 26.5 | 16.4 | 12.7 | 12.3 |
| Hg | <0.1 | <0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ni | 6 | 7.5 | 10.7 | 7.5 | 6 | 6.9 | 4.6 |
| Pb | 26.6 | 158 | 310 | 67.2 | 8 | 5.3 | 3.4 |
| Sb | 4.5 | 6.7 | 5.3 | 8.4 | 5.6 | 4.4 | 6.1 |
| Se | 0.35 | 0.49 | 0.68 | 0.42 | 0.48 | <0.14 | <0.14 |
| Tl | 0.2 | 0.26 | 0.19 | 0.34 | 0.18 | 0.23 | 0.16 |
| V | 38.9 | 58.7 | 52 | 59.2 | 49.9 | 62.4 | 64 |
| Zn | 64.5 | 124 | 164 | 84.5 | 53.4 | 53 | 54.4 |

| Analyte | Trench Soil Sample No. and Location (Cont.) | | | | | Average Concentrations (Trench Soil Samples) |
|---|---|---|---|---|---|---|
| | T8-S-3-01 Trench 8 South End | ST-3-01 Trench 9 SE/NE Floor | ST-2-01 Trench 9 SW/NW Floor | ST-5-01 Trench 9 Floor Center | ST-5-02 Trench 9 Floor Center | |
| Ag | <0.21 | <0.63 | <0.63 | <0.63 | <0.64 | |
| As | 1.2 | 1.8 | 1.5 | 1.4 | 1.2 | 1.4 |
| Ba | 432 | 286 | 386 | 263 | 204 | 311 |
| Be | 0.34 | 0.53 | 0.53 | 0.54 | 0.54 | 0.49 |
| Cd | <0.62 | <0.84 | <0.84 | <0.85 | <0.85 | |
| Cr | 16.3 | 20.3 | 18 | 21.2 | 17.9 | 17.5 |
| Co | 15.3 | 18.6 | 15.8 | 19 | 15.7 | 15.9 |
| Cu | 11 | 16.4 | 15.9 | 15.5 | 14.6 | 18.1 |
| Hg | <0.1 | 0.16 | 0.11 | 0.05 | 0.11 | 0.07 |
| Ni | 6.9 | 8.1 | <6.3 | 8.1 | 9.3 | 8.1 |
| Pb | 3.7 | 10.4 | 9.2 | 7.3 | 6.1 | 36.9 |
| Sb | 4.8 | 6.3 | 9.4 | 4.8 | 5.2 | 6.1 |
| Se | <0.15 | <0.15 | <0.15 | <0.15 | <0.15 | 0.33 |
| Tl | <0.15 | 0.23 | 0.25 | 0.25 | 0.32 | 0.28 |
| V | 58.3 | 61.5 | 53.2 | 64.9 | 50.3 | 57 |
| Zn | 51.1 | 95 | 109 | 96.8 | 74.3 | 77.7 |

Table 6-21 (Cont. page 3)

| Analyte | Creek Bed Soil Sample No. and Location | | | | | | | Average Concentrations (Creek Bed Soil Samples) |
|---|---|---|---|---|---|---|---|---|
| | CBS-A-01 Creek NE bank | CBS-B-01 Creek SE bank | CBS-C-01 Creek NW bank | CBS-D-01 Creek SW bank | CBS-E-01 Creek SW bank | USCB-01 Upstream | USCB-02 Upstream | |
| Ag | <0.2 | <0.2 | <0.22 | <0.22 | <0.22 | <0.75 | <0.72 | |
| As | 1.3 | 0.92 | 0.93 | 1.5 | 1.3 | 0.38 | 0.53 | i |
| Ba | 291 | 467 | 256 | 486 | 312 | 238 | 205 | 322 |
| Be | <0.20 | <0.20 | <0.22 | <0.22 | <0.22 | 0.36 | 0.34 | |
| Cd | <0.6 | <0.6 | <0.66 | <0.66 | <0.65 | <1 | <0.96 | 0.18 |
| Cr | 18.7 | 21.5 | 15.2 | 21.2 | 15.9 | 15.6 | 13.6 | 17.4 |
| Co | 16 | 17.3 | 14.1 | 25 | 13.8 | 14.3 | 12.7 | 16.2 |
| Cu | 23.6 | 20.9 | 12.2 | 22.1 | 16.3 | 13.9 | 11.4 | 17.2 |
| Hg | 0.1 | 0.2 | 0.22 | 0.28 | 0.27 | <0.03 | <0.03 | 0.2 |
| Ni | 9 | 10.6 | 5.6 | 7.8 | 6.6 | <7.5 | <7.2 | 5.7 |
| Pb | 26.1 | 18.7 | 8.9 | 10.2 | 3.6 | 4.8 | 3.5 | 10.8 |
| Sb | 6.4 | 6.2 | <4.4 | 11.3 | 8.8 | 8.1 | 6.4 | 6.7 |
| Se | 0.22 | 0.22 | 0.18 | 0.29 | <0.15 | <0.18 | <0.22 | 0.1 |
| Tl | 0.38 | 0.56 | 0.24 | 0.15 | 0.63 | 0.28 | 0.31 | 0.4 |
| V | 54.8 | 65 | 50.5 | 77.6 | 56.3 | 49.6 | 43.9 | 56.8 |
| Zn | 85.8 | 68.8 | 48.6 | 70.7 | 53.6 | 55.8 | 51.1 | 62.1 |

Table 6-21 (Cont. page 4)

| Analyte | Pond Sediment Sample No. | | | | | | | | | Average Concentrations (Sediment Samples) | Maximum Soil Background Levels (all depth category) | RPRGs[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SCB25-01 | SCB50-01 | SCB75-01 | SCB100-01 | SCB125-01 | SCB150-01 | SCB175-01 | SPN-01 | SPS-01 | | | |
| Ag | <0.74 | <0.73 | <0.71 | <0.7 | <0.79 | <0.72 | <0.86 | <1.1 | <1.3 | | ND | 390 |
| As | 0.4 | 6.24 | 0.57 | 0.35 | 0.34 | 0.29 | 0.55 | 2.3 | 1.7 | 1.42 | 5.26 | 0.39 |
| Ba | 187 | 205 | 135 | 163 | 204 | 148 | 231 | 336 | 416 | 225 | 552 | 5400 |
| Be | 0.35 | <0.24 | <0.24 | <0.23 | 0.3 | <0.24 | <0.29 | 0.54 | 0.6 | 0.22 | 10.95 | 150 |
| Cd | <0.99 | <0.97 | <0.94 | <0.94 | <1.1 | <0.96 | <1.2 | <1.5 | <1.7 | | ND | 37 (9.0*) |
| Cr | 10.6 | 9.7 | 7.7 | 7.7 | 11.5 | 7.2 | 9.6 | 29 | 25.8 | 13.2 | 29.1 | 210 |
| Co | 11.6 | 9.3 | 7.6 | 7.7 | 12.5 | 7.7 | 10.1 | 19.1 | 21.9 | 11.9 | 16.1 | 4700 |
| Cu | 7.9 | 11.3 | 10.6 | 8.9 | 11.2 | 5.4 | 10.1 | 99.1 | 43 | 23.1 | 17 | 2900 |
| Hg | 0.06 | 0.06 | 0.12 | 0.12 | 0.13 | 0.12 | 0.14 | 0.09 | 0.21 | 0.12 | 0.077 | 23 |
| Ni | <7.4 | <7.3 | <7.1 | <7.0 | <7.9 | <7.2 | <8.6 | 68.6 | <12.6 | | 10.4 | 1600(150*) |
| Pb | 10.1 | 11.7 | 9.7 | 36.8 | 27.3 | 8.3 | 14 | 324 | 43.9 | 54 | 17.2 | 400 |
| Sb | 8.1 | 6.2 | 5.6 | 5.8 | 6.5 | <4.6 | <5.5 | 8.4 | 8.6 | 5.5 | ND | 31 |
| Se | 0.27 | <0.17 | <0.17 | <0.16 | <0.18 | <0.17 | <0.20 | 0.68 | 0.51 | 0.16 | ND | 390 |
| Tl | 0.3 | <0.22 | <0.21 | 0.21 | <0.24 | <0.22 | 0.4 | <0.34 | 0.59 | 0.17 | ND | 6.3 |
| V | 40 | 34.3 | 25.7 | 28.8 | 45.1 | 27.6 | 36.5 | 61 | 83.8 | 42.5 | 75.4 | 550 |
| Zn | 82.8 | 81.8 | 68.2 | 59.6 | 76.4 | 39.6 | 105 | 390 | 189 | 121.4 | 413 | 23,000 |

Notes:
- < = Analyte not detected, followed by method detection limit
- NL = RPRG not listed
- MEK = Methyl ethyl ketone
- TRPH = Total Recoverable Petroleum Hydrocarbons
- [1] = RPRG (Preliminary Remediation Goal), Residential Soil (Set at $1x10^{-6}$ and HQ of 1), EPA Region IX, 1999
- * = Cal-Modified RPRG
- mg/kg = milligrams per kilogram

**Table 6-22**
**Metals Concentrations in Pond Surface Water Confirmation Samples**
**Site 40 - Landfill No. 8**
**(µg/L)**

| Analyte | Sample No. | | Spring 1994 | Ambient Water Quality Criteria Aquatic Life (Chronic or 4-Day Average) | RPRGs (Tap Water)/MCL | Maximum West March Background-Groundwater |
|---|---|---|---|---|---|---|
| | AW-YA-01 North Pond Surface Water | AW-YA-02* North Pond Surface Water | | | | |
| Ag | 2.8 J | 24.1 J | ND | 0.12 | 180/100 | ND |
| As | 1.6 J | 1.2 J | ND | 190 | 0.045/50 | ND |
| Ba | 192 J | 193 J | 318 | NL | 2,600/1,000 | 516 |
| Cu | 12.3 J | 11.5 J | ND | 28** | 1,400/1,000 | ND |
| Pb | 0.65 J | 0.63 J | ND | 7.8** | NL/50 | ND |
| Sb | 46.8 J | 50.1 J | ND | 30 | 15/6 | 35.5 |
| Tl | 0.99 J | <0.7 J | ND | 40 | 2.9/2 | 183 |
| V | 5.1 J | 5.8 J | 57 | NL | 260 | 68.4 |
| Zn | 32.5 J | 29 J | 58 | 260 | 11,000 | 58.8 |

Notes: Only those metals which were detected in at least one sample are shown
< = Analyte not detected, followed by method detection limit
* = Duplicate
J = Result is between the PQL and MDL. Analyte was positively identified, but the concentration is uncertain.
NL = RPRG not listed
ND = Not detected
** = Based on hardness of 290 mg/L CaCO3
MCL = Maximum Contaminant Level (not listed where none established).
= RPRG (Preliminary Remediation Goal), Tap Water, EPA Region IX, 1999.

**Site 42 - Building 3404 Transformers**

A quantitative risk assessment was not performed for Site 42 because of an impending removal action at the time of the RI. However, based on comparison to RPRGs, carcinogenic risks from exposure to PCB-contaminated soil were above the manageable risk range for residents and 2 x $10^{-5}$ for industrial workers, indicating a need to mitigate the risk. A removal action was conducted and contaminated soils removed and disposed of off-Base. Confirmation samples showed minor residual PCB contamination in soils at Site 42 (Table 6-23 and Figure 6-10). Residential risk to residual PCBs in soil is within the manageable risk range for carcinogenic risks and less than 1 for non-carcinogenic risks. The carcinogenic risk to industrial receptors is less than $10^{-6}$ based on a RPRG of 0.74 mg/kg (updated 2002 RPRG). The site is currently owned by the County of Riverside.

There are no detected contaminants in groundwater at Site 42 and the removal action has eliminated the potential for contaminants to migrate to groundwater. Therefore, the site has been cleaned to within the manageable risk range as identified by the NCP. No further action is required for Site 42.

Transformer oils may be present in the concrete floor of Building 3404. The Air Force attempted to remove the PCBs from the concrete. Minimal levels of PCBs were left and have been encapsulated to prevent exposure. The concrete is not addressed in this AFRPA OU2 ROD. The County of Riverside has entered into a land use covenant with DTSC to ensure that the use of the building remains restricted to industrial activities.

### *6.1.4 Summary of Sites with Residual Contamination*

As discussed above, four OU2 AFRPA sites have residual contamination above the risk range identified in the NCP. A summary of the site risks is provided in Table 6-24. Table 6-24 includes the location of each site, the residual risk if any, and the identification of the contaminated media. The Administrative Record contains documents with additional details regarding the site, locations, investigations, and, as applicable, the removal actions at the OU2 AFRPA sites. Included in the documents are figures and descriptions of all activities including the confirmation sampling locations and results. The selected controls and the description of the protectiveness to human health of these controls are discussed in Sections 7 and 9.

**Summary of Sites with Residual Risks**

**Site 6 – Landfill No. 4**

Approximately 600,000 cubic yards of non-hazardous waste is wholly contained within the engineered waste cells. The engineered waste cells are located on the footprint of the former Landfill No. 4 and occupy 12 acres (see Figure 5-1). Currently, the site is fenced and maintained. Exposures to the contained materials have not occurred. However, exposure to these contained wastes could occur if the waste cells are damaged or not properly maintained.

**Site 12 – Civil Engineer Yard**

The Civil Engineering yard occupies approximately 20 acres. A non-CERCLA petroleum hydrocarbon action was completed in the former wash rack area. Although some amount of petroleum and metals were left in place, this cleanup action was closed without restrictions. The 1-1 DCE vapor in shallow soil was considered to pose a potential threat in the past. However, as previously stated, 1-1 DCE is no longer considered a suspected human carcinogen, and 1-1 DCE vapors at Site 12 are no longer a threat to human health or the environment. The only remaining contaminated media at Site 12 is a small area of groundwater contamination existing in the northwest section of the site. A precise volume and area of contaminated soil and groundwater is not known. However, the area of contamination does not extend beyond the site boundaries. There are no current exposures because groundwater is not extracted. If groundwater extraction wells were drilled, water users could be exposed to TCE and PCE by drinking and other uses of the water.

**Table 6-23**
**Analytical Results for PCBs by Isomer in Soil Samples**
**Site 42 - Building 3404 Confirmation Samples**
**(mg/kg)**

| Sample No. | MARCH-42-TS S-SL01 | MARCH-42-TS S-SL02 | MARCH-42-TS S-SL2-02 | MARCH-42-TS S-SL03 | MARCH-42-TS S-SL04 | MARCH-42-TS S-SL05 | MARCH-42-TS S-SL06 | MARCH-42-TS S-SL08 |
|---|---|---|---|---|---|---|---|---|
| **Test Method** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** |
| Aroclor 1016 | <0.0034 | <0.0034 | <0.0034 | <0.0033 | <0.0034 | | <0.0033 | <0.02 |
| Aroclor 1221 | <0.0034 | <0.0034 | <0.0034 | <0.0033 | <0.0034 | | <0.0033 | <0.02 |
| Aroclor 1232 | <0.0034 | <0.0034 | <0.0034 | <0.0033 | <0.0034 | | <0.0033 | <0.02 |
| Aroclor 1242 | <0.0035 | <0.0034 | <0.0034 | <0.0033 | <0.0034 | | <0.0033 | <0.02 |
| Aroclor 1248 | <0.0034 | <0.0034 | <0.0034 | <0.0033 | <0.0033 | | <0.0033 | <0.02 |
| Aroclor 1254 | <0.0082 | <0.0082 | <0.0082 | <0.008 | <0.008 | <0.01 | <0.008 | <0.04 |
| Aroclor 1260 | 0.21 | 0.23 | 0.2 | 0.03 | 0.036 | 0.2 | 0.0065 | 0.096 |

| Sample No. | MARCH-42-TS S-SL11 | MARCH-42-TS S-SL12 | MARCH-42-TS S-SL2-12 | MARCH-42-TS S-SL14 | MARCH-42-TS S-SL15 | MARCH-42-TS S-SL18 | MARCH-42-TS S-SL19 | MARCH-42-TS S-SL20 |
|---|---|---|---|---|---|---|---|---|
| **Test Method** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** |
| Aroclor 1016 | | | | <0.0035 | <0.0038 | | <0.0035 | <0.0037 |
| Aroclor 1221 | | | | <0.0035 | <0.0038 | | <0.0035 | <0.0037 |
| Aroclor 1232 | | | | <0.0035 | <0.0038 | | <0.0035 | <0.0037 |
| Aroclor 1242 | | | | <0.0035 | <0.0033 | <0.02 | <0.0035 | <0.0037 |
| Aroclor 1248 | | | | <0.0035 | <0.0038 | | <0.0035 | <0.0037 |
| Aroclor 1254 | <0.01 | <0.01 | <0.01 | <0.0084 | <0.0091 | <0.01 | <0.0084 | <0.0088 |
| Aroclor 1260 | 0.64 | 0.031 | 0.041 | 0.061 | 0.056 | 0.017 | 0.008 | 0.23 |

| Sample No. | MARCH-42-TS S-SL21 | MARCH-42-TS S-SL22 | MARCH-42-TS S-SL23 | MARCH-42-TS S-SL24 | MARCH-42-TS S-SL2-24 | MARCH-42-TS S-SL28 | MARCH-42-TS S-SL29 | MARCH-42-TS S-SL30 |
|---|---|---|---|---|---|---|---|---|
| **Test Method** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** | **8082** |
| Aroclor 1016 | <0.0035 | <0.0036 | <0.0036 | | | <0.0034 | | <0.0036 |
| Aroclor 1221 | <0.0035 | <0.0036 | <0.0036 | | | <0.0034 | | <0.0036 |
| Aroclor 1232 | <0.0035 | <0.0036 | <0.0036 | | | <0.0034 | | <0.0036 |
| Aroclor 1242 | <0.0035 | <0.0036 | <0.0036 | <0.07 | | <0.0038 | | <0.0036 |
| Aroclor 1248 | <0.0035 | <0.0036 | <0.0036 | | | <0.0034 | | <0.0036 |
| Aroclor 1254 | <0.0084 | <0.0086 | <0.0087 | <0.01 | <0.01 | <0.0082 | <0.01 | <0.0085 |
| Aroclor 1260 | 0.015 | <0.0036 | <0.0036 | 0.026 | 0.031 | 0.015 | 0.025 | <0.0036 |

Table 6-23 (Cont. page 2)

| Sample No.<br>Test Method | MARCH-42-TS S-SL31<br>8082 | MARCH-42-TS S-SL35<br>8082 | MARCH-42-TS S-SL36<br>8082 | MARCH-42-TS S-SL39<br>8082 | MARCH-42-TS S-SL40<br>8082 | MARCH-42-TS S-SL41<br>8082 | RPRG(1) |
|---|---|---|---|---|---|---|---|
| Aroclor 1016 | 0.031 | <0.0034 | 0.031 | <0.0034 | <0.0035 | <0.0034 | 3.9 |
| Aroclor 1221 | <0.0034 | <0.0034 | <0.0034 | <0.0034 | <0.0035 | <0.0034 | 0.22 |
| Aroclor 1232 | <0.0034 | <0.0034 | <0.0034 | <0.0034 | <0.0035 | <0.0034 | 0.22 |
| Aroclor 1242 | <0.0034 | <0.0034 | <0.0034 | <0.0034 | <0.0035 | <0.0034 | 0.22 |
| Aroclor 1248 | <0.0034 | <0.0034 | <0.0034 | <0.0034 | <0.0035 | <0.0034 | 0.22 |
| Aroclor 1254 | <0.008 | <0.008 | <0..008 | <0.0081 | <0.0083 | <0.0082 | 0.22 |
| Aroclor 1260 | 0.0052 | 0.18 | 0.063 | 0.066 | 0.12 | 0.006 | 0.22 |

Notes: < = Analyte not detected, followed by method detection limit
(1) = RPRG (Preliminary Remediation Goal) Residential Soil, EPA Region IX, 1999

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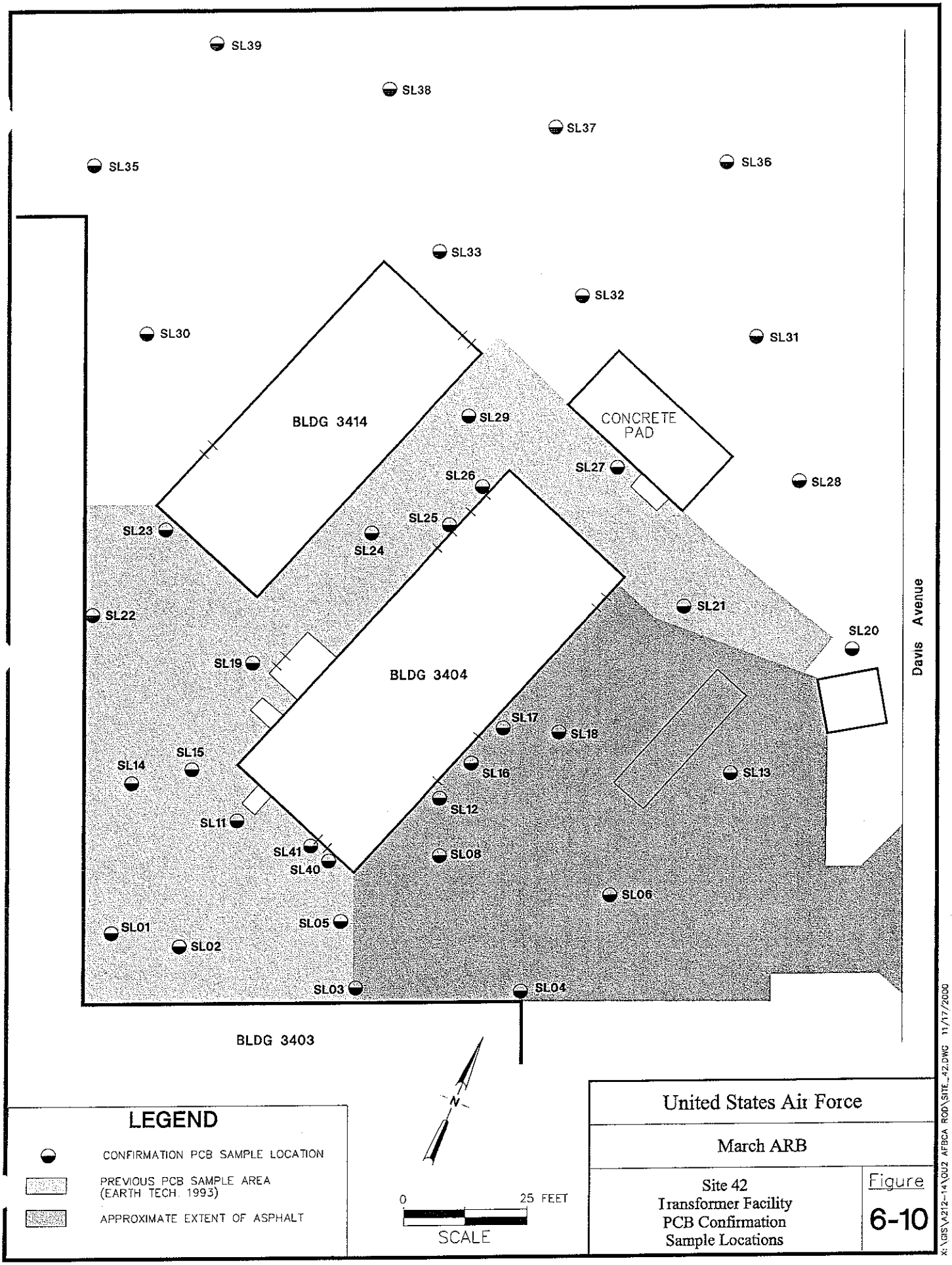
SL39
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SL20
Davis Avenue
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BLDG 3404
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BLDG 3403
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25 FEET
SCALE
LEGEND
CONFIRMATION PCB SAMPLE LOCATION
PREVIOUS PCB SAMPLE AREA (EARTH TECH. 1993)
APPROXIMATE EXTENT OF ASPHALT
United States Air Force
March ARB
Site 42
Transformer Facility
PCB Confirmation
Sample Locations
Figure
6-10
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**Table 6-24**
**Summary of Sites with Residual Risk**

| Site No. | Site Location | Action Based On Residual Risk | Contaminated Media Identification |
|---|---|---|---|
| 3 | West March | None | Not Applicable |
| 6 | West March | Yes | Regulatory Approved Engineered Waste Cells |
| 12 | Main Base | Yes | Groundwater, and Surface and Subsurface Soils |
| 17 | Main Base | Yes | Subsurface Soil |
| 19 | West March | Yes | Surface and Near Surface Soils |
| 20 | Main Base | None | Not Applicable |
| 22 | West March | None | Not Applicable |
| 23 | Off-Base | None | Not Applicable |
| 24 | West March | None | Not Applicable |
| 25 | West March | None | Not Applicable |
| 26 | West March | None | Not Applicable |
| 30 | West March | None | Not Applicable |
| 35 | West March | None | Not Applicable |
| 40 | West March | None | Not Applicable |
| 42 | West March | None | Not Applicable |

Notes: All sites are located on Figure D-1

**Site 17 – Swimming Pool Fill**

Approximately 1,000 cubic yards of PCB contaminated soil remains in the subsurface over an area of approximately 5,000 square feet beneath the former swimming pool structure (see Figure 5-3). There are no current exposures because the contaminated soil is covered with over 8 feet of uncontaminated soil. However, exposures could occur if excavation over 8 feet in depth came in contact with the contaminated soils or brought these soils to the surface where additional exposures could occur by contact or inhalation of dust.

**Site 19 West March Sludge Drying Beds**

Approximately 7,000 cubic yards of surface and near-surface soil contamination (PAHs, PCBs, hexavalent chromium, and thallium) is estimated to exist over the approximate 7.5 acre site in the area of the sludge drying beds (see Figure 5-4). There is no consistent pattern to the contamination throughout the site. However, sampling showed the contamination was concentrated near the sludge beds. Exposures to the contaminated soil could occur to current or future workers at the site if they come in contact with the contaminated soils or inhale dust.

## 6.2 ECOLOGICAL RISK ASSESSMENT

An ecological risk assessment was conducted, as appropriate, to evaluate the potential for site contamination to adversely affect the local ecological receptors. Ecological risk was evaluated for West March sites only. Main Base areas are highly developed (Sites 12 and 17), primarily comprised of landscaping, buildings and/or pavement. These areas offer habitat to very few wildlife species compared to the open areas of rural West March. Routine Main Base activities are also likely to disturb the majority of wildlife. Similarly, ecological risks were not evaluated for West March Sites 35 and 42, which are in developed areas. Like the Main Base, potential habitats at these sites are restricted by buildings, pavement, and human activities. No ecological risk assessments were performed for sites where no contamination was found (Sites 22 and 23). A quantitative

ecological risk assessment was conducted for three West March sites: Site 19, Site 25, and Site 30. No quantitative ecological risk assessments were performed for the following sites where removal actions were completed: Sites 3, 6, 20, 24, 26, and 40.

Site-specific ecological risk assessments at OU2 included problem formulation and preliminary scoping assessment of the potential for adverse ecological impacts.

If the preliminary scoping assessment indicated that the potential for adverse ecological impacts exists, either a quantitative ecological risk assessment or a risk management action was recommended. If a removal was conducted at a site, the Air Force, EPA, and DTSC agreed that a quantitative ecological risk assessment for pre-removal conditions would be of limited value (given that the contaminated material no longer exists) and would not be included, except for Site 25. However, if no removal action had been conducted, a quantitative predictive ecological risk assessment was performed. The quantitative predictive ecological risk assessment built upon information developed in problem formulation and consisted of exposure assessment, effects assessment, and risk characterization.

Prior to the quantitative risk assessment, problem formulation was used to identify the major factors to be considered and established the focus of the ecological risk assessment. Problem formulation set the scope of the risk assessment and ensured that exposure scenarios most likely to contribute to ecological risk were evaluated.

Findings and conclusions for quantitative and qualitative ecological risk assessments are summarized below on a site-specific basis.

### 6.2.1 Qualitative Risk Assessments

The qualitative risk assessments included a preliminary scoping analysis and evaluation of potential impacts. This preliminary scoping assessment evaluated whether there are any habitats or biological receptors of concern present at the site; potentially harmful chemicals released from or present at the site; and finally, any potentially complete exposure pathways through which biological receptors may be exposed to chemicals. A potential for adverse ecological impacts existed prior to removal actions at sites including Site 3, 6, 20, 24, 25, 26, and 40 because receptors of regulatory and ecological concern had been identified.

The qualitative ecological risk assessment performed for the sites where removal actions have occurred concluded that, in general, the removal actions had removed primary contaminants of ecological concern.

Data collected from the sediments in the pond at Site 40 after the removal action, indicate that the mercury, at the detected concentrations, may present a threat to ecological receptors. The Air Force has reviewed the matter with the regulators and concluded that the available information does not indicate that a response action is required at this time. Although there is some reason for concern regarding the mercury levels in the sediment, a mitigation action such as removing sediments or lining the pond with insert material such as rock such that ecological receptors will not be exposed to the sediments, would adversely impact a substantial portion of the wetlands ecosystem. The Air Force has determined that actions taken to prevent ecological exposures would be more detrimental to the wetland habitat at Site 40 than leaving the sediment in place. In light of the existing uncertainty, however, the Air Force will monitor the condition of the pond sediments. Within 2 years, the Air Force will conduct a further ecological evaluation to determine if the above conclusion remains valid. This evaluation will include a screening ecological risk assessment, i.e., the first two steps described in EPA's 1997 Ecological Risk Assessment Guidance.

### 6.2.2 Quantitative Ecological Risk Assessments

Quantitative ecological risk assessments were prepared for Sites 19, 25, and 30 by the methods previously described. The quantitative ecological risk assessment performed for Site 25 showed negligible potential for adverse ecological impact to SKR using conservative assumptions. None of the other representative species for which sufficient applicable toxicity data are available had HI values above 1. The majority of HIs are two to five orders of magnitude less than 1. The results of the conservative, quantitative and predictive risk assessment, therefore, point to a negligible potential for adverse ecological impacts. In addition, all landfilled materials and some soils were removed after the risk assessment was completed and the site has been backfilled, reducing potential risk from past site activities beyond that reported in the risk assessment. Because of the removal action and the low HIs calculated for Site 25, a further discussion of the quantitative risk assessment for Site 25 will not be presented.

**Site 19 - West March Sludge Drying Beds**

The purpose of the ecological risk assessment was to evaluate the potential for adverse ecological effects that may occur as a result of past activities at Site 19, the Sludge Drying Beds. This site supports small areas of highly disturbed, sparse non-native grassland vegetation with no sensitive habitats. I-215 lies to the east of Site 19 and private cultivated land lies to the south. Areas immediately surrounding Site 19 are either developed or dominated by non-native grassland vegetation. Although the planned use of Site 19 is industrial (i.e., wastewater treatment), the ecological risk assessment was performed assuming that this site will support non-native grassland species.

The potential biological receptors of concern and the assessment endpoint were selected to evaluate to reflect concerns at respective levels of biological organization, including individual level impacts for receptors of regulatory concern and population level impacts for receptors of ecological concern.

The selected receptors of concern are listed in Table 6-25. Based on historical observations, recent surveys, and interviews with Base and regulatory biologists, Site 19 supports no receptors of commercial or recreational concern. Therefore, no assessment endpoints for receptors of commercial or recreational concern were established.

The preliminary scoping assessment evaluated whether there were any habitats or biological receptors of concern present at the site and potentially harmful chemicals released from or present at the site. Also evaluated was the potentially complete exposure pathways through which biological receptors may be exposed to chemicals.

A potential for adverse ecological impacts exists at Site 19 as receptors of regulatory and ecological concern have been identified. Also, chemicals of potential ecological concern (COPECs) were identified in biologically accessible soils and confined air spaces of burrows with the potential for an adverse ecological impact. Additionally, the potentially complete exposure pathways linking secondary sources of COPECs to biological receptors of concern were identified for this site. The primary ecological concerns at varying exposure pathways at Site 19 included the potential for a decline in populations of grassland plants due to the uptake of COPECs in soils or a decline in populations of invertebrate decomposers due to the uptake of COPECs in soils. Another primary ecological concern at Site 19 was the potential for decline in populations of herbivorous birds and mammals due to the ingestion of COPECs in soils and plant tissues. Dermal contact with COPECs in soils and the potential for inhalation of volatile COPECs emitted from soils into confined air spaces of burrows were also exposure pathways of ecological concern at this site for herbivorous birds and mammals. Decline in populations of predatory birds and mammals due to ingestion of COPECs in soils and prey tissues and dermal contact by burrowing species with COPECs in soils are also exposure pathways that required assessment at Site 19. Finally, decline in populations of burrowing species of predatory birds and

mammals due to inhalation of volatile COPECs emitted from soils into confined air spaces of burrows was a exposure pathway of ecological concern at Site 19.

The ecological risk assessment for Site 19 also included an analysis of health impacts to individuals for species of regulatory concern due to ingestion of COPECs in soils and prey tissues, dermal contact by burrowing species with COPECs in soils, and/or inhalation by burrowing species of volatile COPECs emitted from soils into confined air spaces of burrows.

The exposure evaluations provided conservative estimates of environmental COPEC exposures to representative species. Concentrations of COPECs were modeled for inhalation exposures. Chemical-specific bioconcentration and/or biotransfer factors were used to calculate exposures to the selected representative receptors of ecological concern.

Toxicity data for each COPEC was obtained from a review of available literature and toxicity databases. Whenever available, chronic No Observable Adverse Effect Level (NOAEL) data for mortality or reproductive effects were used to develop the reference toxicity value (RTV). Chronic NOAEL data for physiological or pathological effects were also used, as these responses are protective of mortality and reproduction. The uncertainty factors used to extrapolate from the observed endpoint to an estimated mean chronic NOAEL are detailed in Table 6-26.

**Table 6-25**
**Assessment Endpoints for Site 19**

| Receptor of Concern | Status | Assessment Endpoint |
|---|---|---|
| **Receptors of Regulatory Concern** | | |
| Red diamond rattlesnake | CSC | • Potential adverse health effects to individuals, including but not limited to mortality, reproductive impairment, and developmental abnormalities. |
| California horned lark | CSC | |
| Loggerhead shrike | FC2 | |
| Cooper's hawk | CSC | |
| Ferruginous hawk | CSC, FC2 | |
| Northern harrier | CSC | |
| Golden eagle | CSC | |
| Burrowing owl | CSC | |
| Stephens' kangaroo rat | FE/SE | |
| Los Angeles little pocket mouse | CSC, FC2 | |
| San Diego black-tailed jackrabbit | CSC, FC2 | |
| **Receptors of Ecological Concern** | | |
| Non-native grassland plants<br>Invertebrate decomposers<br>Herbivorous birds<br>Herbivorous mammals | | • Potentially significant reduction in population abundance or reproduction for member populations of receptors of ecological concern |
| Predatory birds<br>Predatory mammals | | • Potentially significant reduction in abundance of plant and animal populations that are required habitat or important food items for identified receptors of regulatory concern. |

Notes: CSC = California Species of Special Concern
FC2 = Federal Candidate 2, Threatened and Endangered Species
FE/SE = Federal Endangered Species and State Endangered Species

**Table 6-26**
**Uncertainty Factors Used to Extrapolate from Observed Endpoint to Estimated Mean Chronic NOAEL**

| NOAEL | Uncertainty Factors |
|---|---|
| Acute (50% Lethal Dose) $LD_{50}$ to chronic NOAEL | 100 |
| Acute Lowest observable adverse effects level (LOAEL) to chronic NOAEL | 50 |
| Acute to chronic | 10 |
| LOAEL to NOAEL | 10 |

These endpoint-to-chronic NOAEL uncertainty factors were developed based on a review of a toxicity database and were always used to lower available toxicity values to a chronic NOAEL-equivalent (i.e., a more sensitive toxicity value).

Based on these conservative assumptions and the calculated exposure point concentrations, the quantitative risk assessment for Site 19 identified risk to some of the selected ecological receptors from exposure to contaminated soils (Table 6-27).

For each representative species, three HIs were calculated for each COPEC as defined as follows. For the maximally exposed individual who is the most sensitive to COPEC exposures, and to estimate the upper bound of risks, maximum HI is calculated as follows:

$$\text{Maximum HI} = \Sigma(\text{Maximum Exposure} / \text{Minimum RTV}) \qquad (1)$$

When the risk for the typically exposed individual who has an average sensitivity to COPEC exposures and to estimate the average risk, mean HI is determined as follows:

$$\text{Mean HI} = \Sigma(\text{Mean Exposure} / \text{Mean RTV}) \qquad (2)$$

Finally, to estimate risks for the minimally exposed individual who is the least sensitive to COPEC exposures and estimate the lower bound of risks, minimum HI is calculated as follows:

$$\text{Minimum HI} = \Sigma(\text{Minimum Exposure} / \text{Maximum RTV}) \qquad (3)$$

These endpoint-to-chronic NOAEL uncertainty factors were developed based on a review of a toxicity database and were always used to lower available toxicity values to a chronic NOAEL-equivalent (i.e., a more sensitive toxicity value).

Based on these conservative assumptions and the calculated exposure point concentrations, the quantitative risk assessment for Site 19 identified risk to some of the selected ecological receptors from exposure to contaminated soils (Table 6-27).

For each representative species, three HIs were calculated for each COPEC as defined as follows. For the maximally exposed individual who is the most sensitive to COPEC exposures, and to estimate the upper bound of risks, maximum HI is calculated as follows:

$$\text{Maximum HI} = \Sigma(\text{Maximum Exposure} / \text{Minimum RTV}) \qquad (1)$$

When the risk for the typically exposed individual who has an average sensitivity to COPEC exposures and to estimate the average risk, mean HI is determined as follows:

$$\text{Mean HI} = \Sigma(\text{Mean Exposure} / \text{Mean RTV}) \qquad (2)$$

Finally, to estimate risks for the minimally exposed individual who is the least sensitive to COPEC exposures and estimate the lower bound of risks, minimum HI is calculated as follows:

$$\text{Minimum HI} = \Sigma(\text{Minimum Exposure} / \text{Maximum RTV}) \qquad (3)$$

**Table 6-27**
**Summary of Ecological Risk, HI>1**
**Site 19**

| Species | HI>1 | | | COPEC |
|---|---|---|---|---|
| **Animal Species** | **Minimum** | **Mean** | **Maximum** | |
| Invertebrate Decomposers | | | | |
| Earthworms | 2.4 | 87.8 | 878 | Copper |
| Herbivorous Birds | | | | |
| House Finch | - | 18.1 | 298 | Mercury |
| Herbivorous Mammals | | | | |
| SKR | - | 5.3 | 68.6 | Mercury |
| | | 3.18 | 41.5 | 4-Chloroaniline |
| Deer Mouse | - | 15.4 | 475 | Mercury |
| | | 1.0 | 304 | 4-Chloroaniline |
| **Plant Species** | | | | |
| Non-native Plants | | | | |
| Foxtail Chess and Redstem Filaree | - | 8.08 | 80.8 | Copper |

Notes: HI = Hazard Index
COPEC = Chemical of Potential Ecological Concern

The maximum and minimum HIs sets upper and lower bounds on risks likely to be experienced by representative species. For Site 19, HIs were found to be less than 1 for most representative species for which sufficient toxicity data are available. This indicates that, for most receptors of concern, the potential for adverse impacts from exposure to most COPECs is negligible.

The quantitative risk assessment conducted at Site 19 identified the copper, hexavalent chromium, mercury, molybdenum, nickel, toluene, PAHs, PCBs, chlorinated pesticides, and 4-chloroaniline in soil as chemicals of concern. For most non-native grassland and riparian representative species, the risk assessment identified a negligible potential for adverse ecological effects from exposure to hexavalent chromium, molybdenum, nickel, toluene, PAHs, PCBs, and chlorinated pesticides (i.e., HI less than 1).

Potential adverse ecological impacts were identified to invertebrate decomposers from exposures to copper; herbivorous birds from exposures to mercury; herbivorous mammals from exposures to mercury, and 4-chloroaniline; and non-native grassland plants from exposures to copper as shown in Table 6-27.

There is likelihood that the calculated values overestimate risk to receptors at Site 19. Risks from exposure to mercury, detected in eight of 28 soil samples analyzed, are likely overestimated because the maximum concentration (2.12 mg/kg) was used in the risk evaluation. The average concentration of the remaining 21 samples was 0.05 mg/kg, nearly 40 times less than the value used to determine risk. Furthermore, distribution patterns of mercury in soil indicate that occurrences may be localized and would, therefore, probably not cause population-wide impacts. The maximum concentration of copper was also used, which would likely overestimate risks. In addition, risks from exposure to 4-chloroaniline were likely also overestimated because the compound was found in only two of 37 (or about five percent) soil samples analyzed. Conservative assumptions have also been used when estimating risk from volatile organic compounds in burrow areas by assuming lack of air circulation in burrows.

The risk assessment concluded that damage to receptors of concern from remediation of the entire site would probably cause more damage, due to destruction and loss of habitat, than if the contaminants were left in place. Further, the unfavorable conditions at Site 19, produced by current and continued human activities, would prevent the establishment of significant populations of wildlife species and that any wildlife routinely seen at the site is likely tolerant of human activity and disturbance. Finally, the distribution of COPECs in

Table 6-27 indicates that deleterious exposures would be localized and therefore not likely to cause population-wide impacts to species of concern.

**Site 30 - Construction Rubble Burial Site**

The purpose of the ecological risk assessment was to evaluate the potential for adverse ecological effects that may occur as a result of past activities at Site 30, Construction Rubble Site. This site is located in the SKR management area. Site 30 and areas surrounding the site are dominated by disturbed non-native grassland vegetation. The site includes an ephemeral pond, bordered by willows.

The potential biological receptors of concern and the assessment endpoint were selected to evaluate concerns at respective levels of biological organization, including individual level impacts for receptors of regulatory concern, and population level impacts for receptors of ecological concern.

The selected receptors of concern are listed in Table 6-28. Based on historical observations, recent surveys, and interviews with Base and regulatory biologists, Site 30 supports no receptors of commercial or recreational concern. Therefore, no assessment endpoints for receptors of commercial or recreational concern were established.

A preliminary scoping assessment was performed, as discussed under the ecological risk assessment for Site 30. The potential for adverse ecological impacts due to exposure to groundwater in non-native grassland habitat at Site 30 does not exist because groundwater is inaccessible to non-native grassland receptors of concern. However, the potential for adverse ecological impacts due to exposure to soils to terrestrial receptors of regulatory and ecological concern existed at Site 30. Also, COPECs were identified in biologically accessible soils and confined air spaces of burrows with the potential for an adverse ecological impact.

Additionally, the potentially complete exposure pathways linking secondary sources of COPECs to biological receptors of concern were identified for this site

The primary ecological concerns in non-native grassland habitat at Site 30 included the potential for a decline in populations of non-native grassland plants due to the uptake of COPECs in soils or a decline in populations of invertebrate decomposers due to the uptake of COPECs from soil Another primary ecological concern at Site 30 was the potential for decline in populations of herbivorous birds and mammals due to the ingestion of COPECs in soils, surface water (at the ephemeral pond), and plant tissues. Dermal contact with COPECs in soils and the potential for inhalation of volatile COPECs emitted from soils into confined air spaces of burrows were also exposure pathways of ecological concern at this site for herbivorous birds and mammals.

Decline in populations of predatory birds and mammals due to ingestion of COPECs in soils, surface water (at the ephemeral pond), and prey tissues and dermal contact by burrowing species with COPECs in soils are also exposure pathways that required assessment at Site 30. Finally, decline in populations of burrowing species of predatory birds and mammals due to inhalation of volatile COPECs emitted from soils into confined air spaces of burrows was an additional exposure pathway of ecological concern at Site 30.

Potential health impacts to individuals for species of regulatory concern are also ecological concerns in the non-native grassland habitat at Site 30. This was based on ingestion by the individual of COPECs in soils, surface water (at the ephemeral pond), and prey tissues and dermal contact by burrowing species with COPECs in soils plus the inhalation by burrowing species of volatile COPECs emitted from soils into confined air spaces of burrows.

**Table 6-28**
**Assessment Endpoints for Site 30**

| Receptor of Concern | Status | Assessment Endpoint |
|---|---|---|
| **Non-native Grassland Habitat** | | |
| Receptors of Regulatory Concern | | |
| Western spadefoot toad | CSC | • Potential adverse health effects to individuals, including but not limited to mortality, reproductive impairment, and developmental abnormalities |
| Red diamond rattlesnake | CSC | |
| California horned lark | CSC | |
| Loggerhead shrike | FC2 | |
| Cooper's hawk | CSC | |
| Ferruginous hawk | FC2 | |
| Northern harrier | CSC | |
| Golden eagle | CSC | |
| Burrowing owl | CSC | |
| Stephens' kangaroo rat | FE/SE | |
| Los Angeles little pocket mouse | CSC,FC2 | |
| San Diego black-tailed jackrabbit | CSC,FC2 | |
| Receptors of Ecological Concern | | |
| Non-native grassland plants | | • Potentially significant reduction in population abundance or reproduction for member populations of receptors of ecological concern. |
| Invertebrate decomposers | | |
| Herbivorous birds | | • Potentially significant reduction in abundance of plant and animal populations that are required habitat or important food items for identified receptors of regulatory concern. |
| Herbivorous mammals | | |
| Predatory birds | | |
| Predatory mammals | | |
| **Willow Riparian Habitat (Ephemeral Pond at Site 30)** | | |
| Receptors of Regulatory Concern | | |
| Coastal western whiptail | FC2 | • Potential adverse health effects to individuals, including but not limited to mortality, reproductive impairment, and developmental abnormalities. |
| Orange-throated whiptail | FC2 | |
| San Diego horned lizard | CSC | |
| Least Bell's vireo | FE/SE | |
| Yellow warbler | CSC | |
| Willow flycatch | FCE/SE | |
| California horned lark | CSC | |
| Loggerhead shrike | FC2 | |
| Cooper's hawk | CSC | |
| Ferruginous hawk | CSC,FC2 | |
| Northern harrier | CSC | |
| Golden eagle | CSC | |
| San Diego black-tailed jackrabbit | CSC,FC2 | |
| Receptors of Ecological Concern | | |
| Willow riparian and aquatic plants | | • Potentially significant reduction in population abundance or reproduction for member populations of receptors of ecological concern. |
| Invertebrate decomposers | | |
| Amphibians | | • Potentially significant reduction in abundance of plant and animal populations that are required habitat or important food items for identified receptors of regulatory concern |
| Aquatic birds | | |
| Herbivorous birds | | |
| Herbivorous mammals | | |
| Predatory birds | | |
| Predatory mammals | | |

Notes: CSC = California Species of Special Concern
FC2 = Federal Candidate 2, Threatened and Endangered Species
FE /SE = Federal Endangered Species and State Endangered Species
FSE /SE = Federal Sensitive Species and State Endangered Species

Although shallow groundwater in riparian habitat at Site 30 is accessible to deeper-rooted riparian plants (e.g., willows), the potential for adverse ecological impacts due to exposures to groundwater did not exist because no chemicals were identified as COPECs in shallow groundwater. In addition, no volatile organic compounds were detected in soils or shallow groundwater in this habitat; therefore, the inhalation of air in underground burrows poses no risk to fossorial animals in the willow riparian habitat at Site 30. However, a potential for adverse ecological impacts exists in willow riparian habitat at Site 30 because receptors of regulatory and ecological concern were identified at this site. Also, COPECs were identified in biologically accessible soils and confined air spaces of burrows. Finally, potentially complete exposure pathways linking secondary sources of COPECs to biological receptors of concern were identified.

The primary ecological concerns in willow riparian habitat surrounding the ephemeral pond at Site 30 included the potential for decline in populations of emergent aquatic plants due to the uptake of COPECs in sediments. Decline in populations of willow riparian herbaceous plants and trees due to the uptake of COPECs in soils was also an ecological concern in this habitat as was the decline in populations of willow riparian invertebrate decomposers due to the uptake of COPECs in soils.

For the willow riparian habitat at Site 30, potential decline in populations of waterfowl due to ingestion of COPECs in sediments, pond surface water, and aquatic plant tissues was another ecological concern. The potential for decline in populations of willow riparian herbivorous birds and mammals due to ingestion of COPECs in soils, pond surface water, and plant tissues, and dermal contact by burrowing species with COPECs in soils were other ecological concerns at Site 30. Potential decline in populations of predatory birds and mammals due to ingestion of COPECs in soils, pond surface water, and prey tissues, and dermal contact by burrowing species with COPECs in soils were also ecological concerns at Site 30. Finally, health impacts to individuals for species of regulatory concern due to ingestion of COPECs in soils, pond surface water, and prey tissues, and dermal contact by burrowing species with COPECs in soils were considered concerns during the ecological risk assessment at Site 30.

Exposure evaluations, selection of toxicity data, and the quantitative risk assessment for Site 30 were performed as discussed for Site 19 above.

The quantitative risk assessment conducted at this site identified arsenic, molybdenum, selenium, silver, 1,1,1-trichloroethane (1,1,1-TCA) and dioxins/furans as chemicals of concern in soil, and ethylbenzene, toluene, and xylene as chemicals of concern in soil gas. For most non-native grassland and riparian representative species, the risk assessment identified a negligible potential for adverse ecological effects from exposure to arsenic, selenium, silver, 1,1,1-TCA, and dioxin/furans. Negligible risk was also identified to resident aquatic wildlife from arsenic and selenium in surface water with maximum concentrations of these substances below the EPA National Ambient Water Quality Criteria for the Protection of Freshwater Life. Exposure to ethylbenzene, toluene, and xylene was considered infrequent because these compounds were detected in only two of 111 soil gas samples. These compounds are, therefore, not expected to have an adverse impact on ecological receptors.

Potential adverse ecological impacts were identified to plant species, herbivorous birds, herbivorous mammal from exposures to COPECs identified at Site 30 as detailed in Table 6-29.

There is a likelihood that the calculated values overestimate risk to receptors at Site 30. The COPEC, 1,1,1-TCA, was detected in two of nine soil samples collected in non-native grassland habitat at Site 30.

**Table 6-29**
**Summary of Ecological Risk, HI>1**
**Site 30**

| Species | HI>1 | | | Habitat | COPEC |
|---|---|---|---|---|---|
| **Animal Species** | **Minimum** | **Mean[1]** | **Maximum** | | |
| Herbivorous Birds | | | | | |
| House Finch | - | - | 4.92 | Grassland | Molybdenum |
| | - | - | 1.51 | Riparian | Selenium |
| Herbivorous Mammals | | | | | |
| Deer Mouse | - | 1.54 | 46.2 | Grassland | Molybdenum |
| | - | 5160 | 150,000 | Grassland | 1,1,1-TCA |
| SKR | - | - | 7.54 | Grassland | Molybdenum |
| | - | - | 2.4 | Riparian | Selenium |
| | - | 1760 | 22,300 | Grassland | 1,1,1-TCA |
| **Plant Species** | | | | | |
| Non-native Plants | | | | | |
| Foxtail Chess and | - | 2.58 | 25.8 | Grassland | Molybdenum |
| Redstem Filaree | | 2.54 | 25.4 | | Silver |

Notes: HI = Hazard Index
COPEC = Chemical of Potential Ecological Concern
1 = The mean HI provides an estimate of risk to the average individual of a population, i.e., risk due to COPEC exposures

A review of the laboratory analysis indicated that this compound may be a laboratory contaminant, but for conservatism, the compound was carried through the risk assessment process. For 1,1,1-TCA, a maximum concentration of 0.003 mg/kg and a minimum concentration of 0.0002 mg/kg were reported and the 95% Upper Confidence Limit (UCL) was calculated to be approximately 441 mg/kg, over 170,000 times the maximum observed concentration. Based on soil properties for Site 30, soils would be saturated with 1,1,1-TCA at a concentration of 252 mg/kg. Therefore, due to this statistical aberration the exposure concentration used in the risk assessment exceeded soil saturation levels, which is impossible. When using the maximum observed soil concentration, the maximum HIs were reduced by over 10,000, resulting in maximum HIs less than one. Selenium was detected in only the sediment samples collected at Site 30. The selenium is expected to be concentrated in the pond sediments. It is probably indicative of background concentrations and comparison to soil background would show elevated concentrations. Therefore, sediment exposures would likely be overestimated by use of the detected concentration and further overestimated by use of 95% UCL concentrations. Silver was detected in only two samples out of 28 and molybdenum in seven samples out of 28 samples from the depth of interest for ecological risk assessments, and as with selenium use of the 95UCL concentrations would overestimate risks.

The risk assessment concluded that damage to receptors of concern from remediation of the entire site would probably cause more damage, due to destruction and loss of habitat, than if the contaminants were left in place. Additionally, if the site is developed for industrial purposes, no habitat would remain. Therefore, no further action is appropriate for Site 30. Finally, the distribution of COPECS in Table 6-29 indicates that deleterious exposures would be localized and therefore not likely to cause population-wide impacts to species of concern.

# DECISION SUMMARY:
# 7.0 - DESCRIPTION OF ALTERNATIVES

# 7.0 DESCRIPTION OF ALTERNATIVES

The following sections are summaries of groundwater and soil cleanup alternatives evaluated during the OU2 FS. Remedial alternatives were developed for those sites with identified risk.

As previously discussed, some of the sites addressed in the AFRPA OU2 ROD will not require action for one or more of the following reasons: (1) no contamination was found during the OU2 RI; (2) contamination found at the site does not pose a risk to human health or the environment; or (3) contamination has been removed and the remaining contamination, if any, is within the risk range identified in the NCP and does not pose an unacceptable risk.

Contamination was not detected at Site 22 or 23 during the OU2 RI. The risk assessment for Site 30 shows no risk above the risk range identified in the NCP. Sampling following the removal action at Site 40 shows no human health risk above the risk range identified in the NCP. Mercury detected in pond sediments may be a concern for ecological receptors and will be addressed as previously discussed (Section 5.1.14, Page 5-17). Sampling following removal actions at Sites 3, 20, 24, 25, 26, 35, and 42 confirmed that the residual contamination levels are protective of human health and the environment. Details of the investigation are provided in Sections 5 and 6 of this ROD. The remaining sites (Sites 6, 12, 17, and 19), which have contamination requiring response actions, are discussed below.

## 7.1 REMEDIAL ACTION OBJECTIVES

The objective of the remedial actions for the AFRPA OU2 ROD sites at March AFB is to assure that human health and the environment will be protected before and after the property is transferred and used for the expected future use. This objective will be achieved at the four sites requiring further response actions by limiting future use of the property and the groundwater underlying them, as applicable. To prevent unacceptable risks to human health and the environment, the selected restrictions will, among other things, prohibit residential and other uses.

At Site 6, there are additional restrictions detailed in the *Operations and Maintenance Work Plan - Operable Unit 2, Site 6, Landfill No. 4 - March Air Force Base, California* (July 1999) ("Site 6 O&M Work Plan") to assure protection of the engineered waste cells constructed during the removal action and to ensure that the wastes will be contained. Requirements for maintenance and monitoring of the engineered waste cells are described in Title 27 of the California Code of Regulations ("Title 27"). The groundwater at the AFRPA OU2 sites is not now used for drinking, irrigation or any other purpose. However, the groundwater is considered a potential drinking water source, and as such, the objective of any remedial actions for groundwater for the AFRPA OU2 ROD sites at March AFB that require action, is to restrict the use of groundwater until monitoring shows the concentration of contaminants are below MCLs. Of the OU2 sites, only Sites 6 and 12 require action for groundwater. At Site 6, engineering controls are in place to prevent groundwater contact with the waste. Groundwater monitoring is and will be performed as required by Title 27 and the Site 6 O&M Work Plan. At Site 12, restrictions will be placed on groundwater use until contaminant levels in groundwater decline to below MCLs. The groundwater monitoring at Site 12 is and will be performed as part of the comprehensive groundwater-monitoring program under the *Quality Program Plan - Long-Term Groundwater Monitoring, Long-Term Operation, and Long-Term Operation and Maintenance Programs, March ARB, California* (September 2000), as amended and supplemented ("March ARB Quality Program Plan").

The site-specific remedial action objectives are:

**Site 6**

- Limit use of the property to prevent unacceptable risk
- Prevent exposure to landfill waste and landfill gases
- Prevent or minimize migration of landfill contaminants to vadose zone and to groundwater and protect water quality
- Protect remedial system from damage and ensure the integrity of waste cells and associated systems

**Site 12**

- Prevent exposure to contaminated groundwater
- Ensure the integrity of the groundwater monitoring system

**Site 17**

- Limit use of the property to prevent unacceptable risk
- Prevent exposure to contaminated soil

**Site 19**

- Limit use of the property to prevent unacceptable risk
- Prevent exposure to contaminated soil

## 7.2 REMEDIAL ALTERNATIVES FOR SOIL AND GROUNDWATER

This section discusses response actions to address the AFRPA OU2 soil and groundwater. Not all response actions described below were evaluated for each site. The actions evaluated for each site were selected based on current site conditions, including the results of previous removal actions at Sites 6, 12 and 17. If removal actions were completed for the site, only the No Action Alternative and ICs Alternative were evaluated. The removal action process evaluated other remedial alternatives, including alternatives resulting in unrestricted land use. Detailed descriptions of the evaluated treatment methodologies are provided in Section 2.5 of the *Final Remedial Investigation/Feasibility Study (RI/FS) Operable Unit #2, March Air Force Base (AFB)*, July 1997. The Air Force will conduct five-year reviews to ensure the continued protection of human health and the environment, as specified in CERCLA and the FFA.

Selected remedies must comply with applicable or relevant and appropriate requirements (ARARs). The ARARs for Sites 6, 12, 17, and 19 are listed in Appendix C. In accordance with the March AFB Federal Facilities Agreement, the parties agree that the selected remedies meet or exceed all applicable or relevant and appropriate federal and state laws and regulations to the extent required by CERCLA Section 121 (42 U.S.C. § 9621). Subject to that prior agreement and the selection of remedies for the sites in this ROD, the State's authority to bring actions based on violations of State law or regulation that may threaten human health or the environment, or to otherwise enforce such State legal authority, is not impaired by that authority not being listed as an ARAR in this ROD

**No Action.**

The No Action Alternative must be evaluated at each site as a basis for comparison of existing site conditions with other proposed alternatives. Under this alternative, no action would be taken to address groundwater or soil contamination or to minimize further contaminant releases.

**ICs Alternative.**

ICs are being applied to only four sites (see figure 7-1). ICs for Site 6 and Site 12 are intended to preserve the engineering controls and groundwater monitoring systems previously implemented through removal actions and to prevent or limit exposure to contaminants. The ICs are non-technical, non-engineering actions that support or complement the required landfill post-closure actions and groundwater monitoring being performed under the March ARB Quality Program Plan. At Sites 17 and 19, the ICs are the only remaining component of the remedy.

Specific language is included in this ROD regarding implementation, monitoring, and enforcement of the selected ICs. Therefore, compliance with the terms of this ROD will be protective of human health and the environment. Because the restrictions are specifically described in Section 9 and the means for implementing the restrictions are detailed in Section 7, it is not necessary for the Air Force to submit any new post-ROD, IC implementation documents, such as a Land Use Control Implementation Plan (LUCIP), a new O&M plan or a Remedial Action (RA) work plan. The existing Site 6 O&M Work Plan will be revised to include the restrictions as well as the implementation, monitoring, reporting and enforcement measures described in Section 7.2.1, "ICs Alternative." The Air Force in its discretion, may develop one or more such documents, and will provide USEPA and the State of California any implementation documents it develops.

As part of the NPL deletion process, EPA must make the determination that the remedial action for OU2 has achieved its objectives. In this case, because the OU2 remedy consists of ICs only, EPA's determination that the remedy achieved its protectiveness objectives will be made based on the IC annual monitoring reports, so long as adequate information is provided in the reports.

The ICs Alternatives include various enforceable use restrictions and land use controls on the use of the property and groundwater. The Air Force is responsible for implementing, maintaining, monitoring and reporting the remedial actions (including institutional controls) before and after property transfer. The Air Force will exercise this responsibility in accordance with CERCLA and the National Contingency Plan (NCP). Any grantee of property constrained by ICs imposed in their deed may request modification or termination of the ICs. Any modification or termination must be approved by the Air Force, USEPA, and the State of California.

The regulatory agencies may conduct inspections of operations and maintenance activities and ICs at Sites 6, 12, 17, and 19 and groundwater monitoring at Sites 6 and 12. The Air Force will continue to provide access to the property for those purposes, as required under the Federal Facilities Agreement, and the deed transferring the property will reserve a right of access to the property for those purposes for itself, USEPA, and the State of California.

During the time between adoption of this ROD and deeding of the property, equivalent restrictions are implemented by lease terms. The parcels of property encompassing Sites 12, 17 and 19 are currently leased in furtherance of conveyance to the March Joint Powers Authority under Air Force Lease No. BCA-MAR-13-00-0101 (2000) ("Master Lease"). The lease restrictions are in place and operational and will remain in place until the property is transferred by deed. At the moment of deed transfer, the lease restrictions will be superseded by the restrictions to be included in the federal deed and the State Land Use Covenant described in this ROD

The property encompassing Site 6 is currently retained by the Air Force. The existing Site 6 O&M plan prohibits access and use except for activities directly related to the operation and maintenance of the landfill remedy. Upon deed transfer, the lease and its restrictions will terminate and the restrictions the federal deed and the State Land Use Covenant described in this ROD will become effective. For any property transferred to another federal agency, the transfer document will provide that the agency will incorporate the restrictions into its land use comprehensive plan and include the restrictions in any transfer to another federal agency or future deed to a non-federal entity.

Meeting remedial action objectives shall be the primary and fundamental indicator of performance, the ultimate aim of which is to protect human health and the environment. Performance measures for ICs are the remedial action objectives, plus the actions necessary to achieve those objectives. It is anticipated that successful implementation, operation, maintenance, and completion of these measures will achieve protection of human health and the environment and compliance with all legal requirements

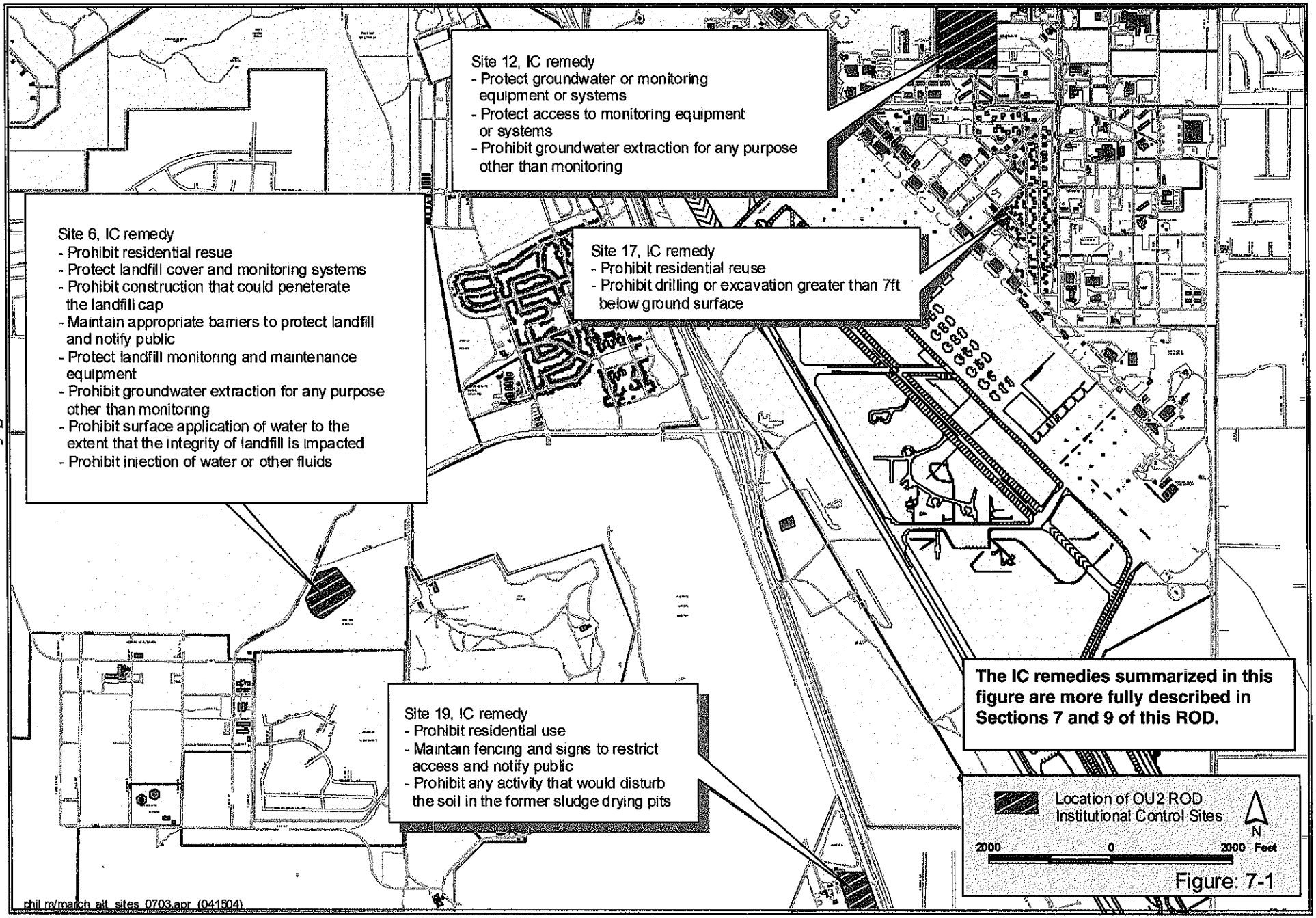
Descriptions of the ICs for Sites 6, 12, 17, and 19 are provided in site-specific discussions below and in Section 9 of this ROD. The maintenance requirements for the Site 6 landfill engineered waste cells are further described in the Site 6 Operations and Maintenance (O&M) Work Plan (Tetra Tech, Inc and Black & Veatch, 1999). One task within the Site 6 O&M is the monitoring of landfill gas migration. Very recent monitoring results indicate that a landfill gas control action may be necessary. As appropriate, the OU2 ROD or Site 6 O&M Work Plan will be modified (e.g. explanation of significant differences, modification, or addendum) to include any future landfill gas remedial action(s) in compliance with CCR Titles 22 and 27 and relevant South Coast Air Quality Management District Rules.

Within 180 days of the execution of this Record of Decision, the Air Force will submit to the regulatory agencies for review and approval a revised O&M Work Plan that will include sampling and monitoring requirements for landfill gas, including frequency, location, analytical methods and field procedures in accordance with California Code of Regulations, Title 22 and Title 27. If the sampling and monitoring of landfill gas reveals that the concentrations of hazardous constituents are above regulatory limits, the Air Force will submit a plan to control the release of such substances to the regulatory agencies for review and approval. As appropriate, the OU2 ROD will be modified (e.g., explanation of significant differences or amendment) to include any future landfill gas remedial action(s).

The Air Force may contractually arrange for third parties to perform any and all of the above actions, although the Air Force is ultimately responsible under CERCLA for the successful implementation of the ICs, including monitoring, maintenance, review, and reporting of ICs.

*Deed Restrictions and Reservation of Access*

Each federal deed or letter of transfer to another federal agency will include a description of the residual contamination on the property, as described in the discussions of the sites below, and the specific restrictions set forth in Section 9. The ICs, in the form of deed restrictions, are "environmental restrictions" under California Civil Code section 1471. Letters of transfer to other federal agencies will also include a requirement that further transfers of the property, whether by deed or letter of transfer, will contain appropriate provisions to ensure that the restrictions continue to run with the land, as provided in California Civil Code section 1471. Deeds and letters of transfer will include legal descriptions of the sites covered by restrictions and of the locations of monitoring wells at Site 6 and Site 12.


Site 12, IC remedy
- Protect groundwater or monitoring equipment or systems
- Protect access to monitoring equipment or systems
- Prohibit groundwater extraction for any purpose other than monitoring
Site 6, IC remedy
- Prohibit residential resue
- Protect landfill cover and monitoring systems
- Prohibit construction that could peneterate the landfill cap
- Maintain appropriate barriers to protect landfill and notify public
- Protect landfill monitoring and maintenance equipment
- Prohibit groundwater extraction for any purpose other than monitoring
- Prohibit surface application of water to the extent that the integrity of landfill is impacted
- Prohibit injection of water or other fluids
Site 17, IC remedy
- Prohibit residential reuse
- Prohibit drilling or excavation greater than 7ft below ground surface
Site 19, IC remedy
- Prohibit residential use
- Maintain fencing and signs to restrict access and notify public
- Prohibit any activity that would disturb the soil in the former sludge drying pits
The IC remedies summarized in this figure are more fully described in Sections 7 and 9 of this ROD.
Location of OU2 ROD Institutional Control Sites
N
2000 0 2000 Feet
Figure: 7-1
phil m/march afr sites 0703.apr (041504)

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Each deed will also contain a reservation of access to the property as required under CERCLA for the Air Force, USEPA, and the State of California, and their respective officials, agents, employees, contractors, and subcontractors for purposes consistent with the Air Force Installation Restoration Program ("IRP") or the Federal Facility Agreement ("FFA")

The environmental restrictions are the basis for part of the CERCLA 120(h)(3) covenant that the United States is required to include in the deed for any property that has had hazardous substances stored for one year or more, known to have been released or disposed of on the property. During the time between adoption of this ROD and deeding of the property, appropriate restrictions are implemented by the lease between the Air Force and the March Joint Powers Agency.

*Notice of Institutional Controls*

The Air Force will include the specific deed restriction language set forth in Section 9 in any FOST for a parcel that includes one of the sites for which ICs are selected pursuant to this Record of Decision, and will provide a copy of the deeds to the regulatory agencies as soon as practicable after the transfer of fee title. The deed restriction language and State Land Use Covenant language incorporating those restrictions will be consistent. The Air Force will provide information to the property owners regarding necessary ICs in the FOST and the draft deed. The signed deed will also include the specific land use restrictions. The information will also be communicated to appropriate state and local agencies with authority regarding any of the activities or entities addressed in the controls to ensure that such agencies can factor the information into their oversight, approval, and decision-making activities.

*Annual Evaluations/Monitoring*

The Air Force will conduct annual monitoring and undertake prompt action to address activity that is inconsistent with the IC objective or use restrictions, exposure assumptions (such as industrial use, rather than residential use) or any action that may interfere with the effectiveness of the ICs. The Air Force will submit to the regulatory agencies annual monitoring report on the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. The report will also address whether the owners and affected state and local agencies were notified of the controls affecting the property. The IC monitoring reports will not be subject to approval and/or revision by the regulatory agencies. The annual monitoring reports will be used as part of the Five Year Review to evaluate the effectiveness of the remedy. The Five-Year Review report will make recommendations on the continuation, modification, or elimination of annual reports and IC monitoring frequencies. The Five-Year Review report will be submitted to the regulatory agencies for review and comment.

*Response to Violations*

The Air Force will notify EPA and the State via e-mail or telephone as soon as practicable, but no later than 2 weeks after discovery of any activity that is inconsistent with the IC objective or use restrictions, exposure assumptions or any action that may interfere with the effectiveness of the ICs. Not later than 10 days following such notice, the Air Force will provide EPA and the State with a description of the corrective actions taken or planned (including proposed enforcement actions, if any) to address the conditions described in the notice This description is not subject to regulator review. Any violations that breach federal, state or local criminal or civil law will be reported to the appropriate civilian authorities, as required by law.

*Enforcement*

The regulatory agencies may conduct inspections of the ICs at Sites 6, 12, 17 and 19. Prior to property transfer, the Air Force will provide access to the regulatory agencies for the purpose of inspections. The deed transferring property or letter of transfer to another federal agency will provide for such access to the regulatory agencies.

Any activity that is inconsistent with the IC objective or use restriction, exposure assumptions or any action that may interfere with the effectiveness of the ICs will be addressed by the Air Force as soon as practicable after the Air Force becomes aware of the violation, but in no event will the process be initiated later than 14 days after the Air Force discovers the violation. The Air Force will exercise such rights as it retained under the transfer documents to direct that activities in violation of the controls be immediately halted. To the extent necessary, the Air Force will engage the services of the Department of Justice to enforce such rights. State law gives the State separate enforcement authority against future landowners. See "State Land Use Covenants," below.

*Approval of Land Use Modification*

The recipient of the property will obtain joint approval from the Air Force, USEPA and the State of California for any proposals for modification of ICs or for any proposal for a modification of land use at a site inconsistent with the use restrictions and assumptions described in the ROD.

*State Land Use Covenants*

Before transfer of title to the property including one or more of the sites at which ICs are selected to a non-federal entity, the Air Force will execute a State Land Use Covenant with the State that includes the restrictions described in Section 9, legal descriptions of the property and affected areas, and provisions for regulatory agency access for purposes of inspections, monitoring and other activities. The State Land Use Covenant will be recorded before the recording of the federal deed. The State will enter into the State Land Use Covenant pursuant to State law, including California Code of Regulations, Title 22, Section 67391.1. The State Land Use Covenant will be based on the model Covenant to Restrict Use of Property developed by DTSC. Modifications or termination of the State Land Use Covenant must be undertaken in accordance with State law, CERCLA, the National Contingency Plan, and the Installation Restoration Program. In addition, Title 22, California Code of Regulations Section 67391.1 imposes certain obligations and restrictions on DTSC, including prohibitions on DTSC's certifying satisfactory completion of response actions, or approving or concurring in certain response action decision documents, or considering property suitable for transfer to non-federal entities, unless appropriate land use covenants will be executed and recorded when hazardous substances will remain at the property at levels that are not suitable for unrestricted use. This regulation also provides for modification and termination of State Land Use Covenants. The Air Force will pay the State of California reasonable, nondiscriminatory costs associated with administration of the State Land Use Covenants, subject to appropriation of funds through the Defense State Memorandum of Agreement or some alternative payment mechanism. "Nondiscriminatory costs" means costs similar to those paid by other parties for such land use covenant administration.

## Excavation and Offsite Incineration Alternative

Under the Excavation and Offsite Incineration Alternative for Site 19, the soils with residual contamination above levels protective of human health and the environment would be excavated and treated by incineration. The excavated soils would be transported to an offsite incineration facility in compliance with appropriate state and federal regulations. The excavations would be restored by backfilling or regrading and reseeding of the area disturbed during the remedial action. Wastes may be incinerated in an inclined rotating kiln incinerator. Waste and auxiliary fuels are introduced to the high end of the kiln, and the rotation of the kiln agitates the

solid materials being burned. The primary combustion chamber is maintained at temperatures of 1,000°F to 1,800°F. Exhaust gases from the kiln are passed to a secondary chamber or afterburner where they are exposed to temperatures around 2,200°F. Residual ash and exhaust vapors generally require further treatment.

**Excavation and Off-Base Landfill Disposal Alternative**

Under the Excavation and Off-Base Landfill Disposal Alternative for Site 19, the soils with residual contamination above levels protective of human health and the environment would be excavated. The excavated soils would be transported to and disposed of in a licensed waste treatment, storage and disposal facility (TSDF). The excavations would be restored by backfilling or regrading and reseeding of the area disturbed during the remedial action.

### 7.2.1 Site 6 – Soil and Groundwater

At Site 6, contamination is contained within the engineered waste cells. A removal action including the construction of these engineered waste cells, was conducted in accordance with the Site Specific Action Memorandum, Site 6, OU-2, February 1995 and the Modification to the Site-Specific Removal Action Memorandum, Site 1, 9, 25 and 12 UST Locations and Consolidation to OU2 Site 6, February 1996. This ROD recognizes the completion of that action and selects the addition of ICs as the final remedy for the site. Operation, maintenance and monitoring of the Site 6 landfill closure are ongoing per the approved O&M Work Plan (Tetra Tech, Inc and Black & Veatch, 1999) and the March ARB Quality Program Plan. The Air Force will continue to implement the O&M Work Plan to protect the waste cells and cap and to ensure continued proper operation of the liner and leachate control system. The Air Force will also revise the O&M Work Plan to include monitoring of possible migration and control of the landfill gases. Additional information regarding Site 6 site characteristics is provided in Section 5.1.2 and in Section 6.1.3.

The following remedial alternatives were evaluated for Site 6:

- No Action, and
- ICs Alternative.

The anticipated future land use for Site 6 is passive use associated with open space use specified in the March reuse plan (March Joint Powers Authority, 2003). The site currently is open space with no structures except the engineered waste cells and associated features. The passive use associated with open-space land use is the exposure scenario used to select the remedy.

***Description of Remedy Components.***

*No Action.*

Under this alternative, the engineered waste cells and the existing monitoring and other systems could be more vulnerable to disturbance or removal. This alternative would not address the potential for direct exposure to construction or industrial workers or residents should the site be developed, prevent migration of the contaminants should future construction expose contaminated materials in the waste cells, or protect the waste cells from damage from any type of construction activities or natural forces such as erosion. Therefore, it does not provide overall protection of human health and the environment.

*ICs Alternative.*

The ICs imposed at Site 6 will include controls to limit exposure to contaminated soil, prevent or minimize migration of landfill contaminants, and protect the integrity of the engineered waste cells and associated structures.

The institutional controls imposed on Site 6 would:

***Limit use of the property to prevent unacceptable risk by -***

- prohibiting use for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day care centers for children.

**Prevent exposure to landfill waste and gases and ensure the integrity of the waste cells by -**

- prohibiting construction, excavation, drilling, grading, removal, trenching, filling earth movement, mining, or planting that would disturb the soil or the landfill cover, including the vegetative cap, except for the purpose of monitoring groundwater or landfill gas.
- prohibiting extraction of groundwater for any purpose other than monitoring.
- prohibiting disturbance or removal of fencing or, signs, or other barriers intended to exclude the public from the landfill.

***Prevent or minimize migration of landfill contaminants to vadose zone and to groundwater and protect water quality by -***

- prohibiting the surface application of water (e.g. irrigation) to the extent that the integrity of the landfill is impacted and injection of water or other fluids that might affect groundwater flow direction.
- prohibiting activities that could affect the drainage, sub-drainage, or erosion controls for the landfill cover.

**Protect remedial system from damage and protect the integrity of waste cells and associated systems by -**

- prohibiting disturbance of any equipment and systems associated with monitoring and maintenance or settlement monuments.
- prohibiting activities that would limit access to any equipment and systems associated with monitoring and maintenance or settlement monuments.

This alternative will not reduce contaminant toxicity, mobility or volume of contaminants. However, offsite migration is considered unlikely under the specified restrictions because the waste has been contained within engineered waste cells

This alternative complies with ARARs as listed in Appendix C. ARARs for landfill operation and maintenance are included in the Site 6 O&M Closure/Post Closure Maintenance Plan, Site 6, OU-2, Final, May 1995 and continue to be valid requirements despite not being repeated here as ARARs. Additional ARARs for inclusion in the Site 6 O&M Work Plan are also listed in Appendix C.

Costs for this alternative consist of the estimated annual costs of institutional controls and reporting. The cost of landfill operations and maintenance (cap maintenance, groundwater monitoring, leachate collection/disposal, and reporting) is not included in the cost estimate for the ICs alternative. These existing, ongoing costs are estimated at $50,000 per year.

ICs would be required until modified or terminated with the approval of the regulatory agencies. Because there are no historical cost data on maintenance of ICs, the estimated cost of doing so has a high degree of uncertainty. Because it does not include considerations such as probable economies of scale that would be realized by combining like activities for numerous sites, it must be considered a conservative (high) estimate. No capital costs are associated with this alternative.

| | |
|---|---|
| Estimated Annual Cost of ICs Remedy | $20,000 |

### 7.2.2 Site 12 – Groundwater and Surface and Subsurface Soil

At Site 12, residual petroleum hydrocarbon contamination remains near a washbasin. Excavation during a removal action was halted on the north and east sides of the washbasin before all petroleum hydrocarbon residues were removed. With the agreement of the regulators that the contamination levels were acceptable because the physical setting of the contaminated areas minimized the chance for human exposure to the soils, the excavation was backfilled with clean soil. Confirmation sampling demonstrated that the metals cadmium and chromium were removed to below industrial PRGs, but remain above residential PRGs. However, the risk is within the risk range identified in the NCP and no restrictions on use are required for metals. Additional information is provided in Sections 5.1.3 and 6.1.3. No ICs are required for that petroleum hydrocarbon contamination, because the residual contamination levels of those contaminants are acceptable for unrestricted use.

Groundwater beneath Site 12 has become impacted by TCE and PCE. The groundwater contamination is in a small area and is only slightly above maximum contaminant levels (MCLs).

The anticipated future land use for Site 12 is mixed use which includes a variety of complementary land uses such as commercial, business park, offices, medical, vocational, research and development, and services (March JPA, 1999). The site currently is developed with multiple structures formerly used as work areas and office space for civil engineering operations on March AFB. Mixed use is the exposure scenario used to select the remedy. The following remedial alternatives were evaluated for the residual contamination remaining after the removal action at Site 12:

- No Action, and
- ICs Alternative.

#### *Description of Remedy Components.*

*No Action.*

Under this alternative, existing monitoring systems would be more vulnerable to disturbance or removal and nothing would prevent withdrawal and usage of contaminated groundwater with subsequent exposures from drinking or bathing. Therefore, it provides no overall protection of human health and the environment.

*ICs Alternative.*

The ICs imposed at Site 12 will include controls to limit exposure to TCE- and PCE-contaminated groundwater and protect groundwater-monitoring systems.

Institutional controls at Site 12 would:

**Protect the groundwater-monitoring system by-**

- prohibiting disturbance of any equipment and systems associated with groundwater monitoring.
- prohibiting activities that would limit access to any equipment and systems associated with groundwater monitoring.

**Prevent exposure to contaminated groundwater by -**

- prohibiting groundwater extraction for any purpose other than monitoring

This alternative will not reduce contaminant toxicity, mobility or volume of contaminants. However, offsite migration is considered unlikely because of the low concentrations and limited extent of contamination in the groundwater.

This alternative complies with ARARs, as listed in Appendix C. ARARs for monitoring are included in the March ARB Quality Program Plan and continue to be valid requirements, despite not being repeated here as ARARs. Additional ARARs for inclusion in the March ARB Quality Program Plan are also listed in Appendix C.

Costs for this alternative consist of the costs of ICs site inspections and reporting, but do not include the costs of groundwater monitoring, which is being performed under the March ARB Quality Program Plan. ICs would be required until modified or terminated. Because there are no historical cost data on maintenance of ICs, the estimated cost of doing so has a high degree of uncertainty. Because it does not include considerations such as probable economies of scale that would be realized by combining like activities for numerous sites, it must be considered a conservative (high) estimate.

| | |
|---|---|
| *Estimated Annual Cost of ICs Remedy* | *$6,000* |

### 7.2.3 Site 17 - Subsurface Soil

At Site 17, low levels of PCBs are present in soils at least 8 feet beneath the ground surface. No PCB contamination has been found in the groundwater. Additional information regarding the remedial contamination at Site 17 is provided in Sections 5.1.4 and 6.1.3.

The anticipated future land use for Site 17 is part of the historic district that includes the adjacent Green Acres Housing Area (March JPA, 1999). The site currently is open space with no structures.

The following remedial alternatives were evaluated for Site 17 subsurface soil:

- No Action, and
- ICs Alternative.

### *Description of Remedy Components*

*No Action.*

Under this alternative, the site would be unprotected. This alternative would not reduce the potential for exposure to construction or industrial workers or residents should the site be developed, or prevent migration of the contaminants should future construction expose the contaminated materials that are below the surface. Therefore, it provides no overall protection of human health and the environment.

*ICs Alternative.*

The ICs imposed at Site 17 will include controls to limit exposure to contaminated soil and to ensure that the property is safe for industrial or commercial use

Institutional controls at Site 17 would:

**Reduce risk to acceptable level by -**

- prohibiting use for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day care centers for children.

**Prevent exposure to contaminated soil by -**

- prohibiting any activity that will disturb the soil at or below 7 feet below ground surface.

This alternative will not reduce contaminant toxicity, mobility or volume of contaminants. However, offsite migration is considered unlikely because of the low mobility of the residual contamination.

This alternative complies with ARARs (Appendix C).

Costs for this alternative consist of the estimated annual cost of ICs such as site inspections and reporting. ICs would be required until modified or terminated. Because there are no historical cost data on maintenance of ICs, the estimated cost of doing so has a high degree of uncertainty. Because it does not include considerations such as probable economies of scale that would be realized by combining like activities for numerous sites, it must be considered a conservative (high) estimate. No capital costs are associated with this alternative.

| | |
|---|---|
| Estimated Annual Cost of ICs Remedy | $6,000 |

### 7.2.4 Site 19 - Surface and Near-surface Soil

In the past at Site 19, sludge from the wastewater treatment facility was spread in unlined drying beds. Surface and near-surface soils contaminated with PAHs, PCBs, hexavalent chromium, and thallium were found sporadically throughout the site. Additional information regarding Site 19 is found in Sections 5.1.5 and 6.1.3.

The current and anticipated future land use for Site 19 is a public wastewater treatment facility (March JPA, 1999). The western portion of the site currently contains sludge drying beds associated with the adjacent wastewater treatment facility. The eastern portion of the site is undeveloped open space.

The following remedial alternatives were evaluated for Site 19 surface and near-surface soil:

- No Action,
- ICs Alternative,
- Excavation and Off-Base Landfill Disposal, and
- Excavation and Off-Base Incineration.

***Description of Remedy Components.***

*No Action.*

Under this alternative, affected soils would remain in place untreated. This alternative would not reduce the potential for exposure to industrial workers or construction or residents should the site be developed, or prevent migration of the contaminants should future construction cause dispersion of contaminated soils. Therefore, it provides no overall protection of human health and the environment.

*ICs Alternative.*

The ICs imposed at Site 19 will include controls to limit exposure to contaminated soil and to ensure that the property is safe for industrial or commercial use.

Institutional controls at Site 19 would:

**Limit use of the property to prevent unacceptable use by -**

- prohibiting use for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day care centers for children.

**Prevent exposure to contaminated soil by -**

- prohibiting any activity that would disturb the soil in the former sludge drying pits.
- prohibiting removal, disturbance, or other interference with fences or other barriers to access to or signs notifying the public of Site 19.

This alternative will not reduce contaminant toxicity, mobility or volume of contaminants. However, offsite migration is considered unlikely due to the low mobility of the contaminants involved.

This alternative complies with ARARs (Appendix C).

Costs for this alternative consist of the estimated annual cost of maintaining the fence and of ICs site inspections and reporting. ICs would be required until modified or terminated. Because there are no historical cost data on maintenance of ICs, the estimated cost of doing so has a high degree of uncertainty. Because it does not include considerations such as probable economies of scale that would be realized by combining like activities for numerous sites, it must be considered a conservative (high) estimate. No capital costs are associated with this alternative.

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|---|---|
| Estimated Annual Cost of ICs Remedy | $7,000 |

*Excavation and Off-Base Disposal*

This alternative would include the excavation, transport, and disposal of affected soil in an off-site landfill. The excavation would be backfilled with clean soil. This alternative would be protective of human health for all exposure scenarios and the environment because contaminants would be removed from the site. The soil would not be treated, and there would be no change in the volume and toxicity of the material. The material would be confined in a closed cell, and the mobility would be reduced. Short-term effects during excavation and handling of contaminated soil would be controlled by implementing engineering controls and by using proper personal protective equipment. The cost of this alternative would be relatively high compared to the reduction in risk that would be achieved especially as related to use as a public facility.

Costs for this alternative consist of the one-time costs for excavation, transport and off-site disposal in the estimated one-year implementation period. No recurring operation and maintenance costs are associated with this alternative.

| | |
|---|---|
| Total Project Cost/Present Worth: | $3,402,700 |
| Capital Cost: | $3,402,700 |
| Annual O&M Cost: | $0 |

(One-time cost, assuming 7,000 cubic yards of soil)

*Excavation and Off-Site Incineration*

This alternative would include the excavation of affected soil, transport of this soil to an off-site licensed treatment facility, and treatment by incineration. The excavation would be backfilled with clean soil. This alternative would be protective of human health for all exposure scenarios and the environment because contaminants would be removed from the site providing long-term effectiveness and permanence. The cost of this alternative would be relatively high compared to the reduction in risk that would be achieved especially as related to use as a public facility. Long-term effectiveness and permanence and reduction of toxicity, mobility, and volume of contaminants would be achieved. Short-term effects during excavation and handling of contaminated soil would be controlled by implementing engineering controls and by using proper personal protective equipment.

Costs for this alternative consist of the one-time costs for excavation, transport and off-base incineration in the estimated one-year implementation period. No recurring operation and maintenance costs are associated with this alternative.

| | |
|---|---|
| Total Project Cost/Present Worth: | $3,772,800 |
| Capital Cost: | $3,772,800 |
| Annual O&M Cost: | $0 |

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# DECISION SUMMARY:
# 8.0 - SUMMARY OF COMPAR. ANALYSIS OF ALTERNATIVES

# 8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Each of the remedial alternatives identified in this ROD has been evaluated against the nine evaluation criteria set forth in the NCP (*see* 40 C.F.R. § 300.430(e)(9)). The nine criteria are organized into three categories; threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs between remedies. Modifying criteria are formally taken into account after public comment is received on the Proposed Plan. The criteria, as well as the evaluation of the alternatives against such criteria, are set forth below.

THRESHOLD CRITERIA

- ***Overall protection of human health and the environment*** determines whether an alternative can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances present at the sites.
- ***Compliance with Applicable or Relevant and Appropriate Requirements ("ARARS")*** evaluates whether the alternative attains Federal and State environmental statutes, regulations, and other requirements that pertain to the Site.

PRIMARY BALANCING CRITERIA

- ***Long-term Effectiveness and Permanence*** considers the ability of an alternative to maintain protection of human health and the environment over time.
- ***Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment*** evaluates an alternative's use of treatment to reduce the harmful effects of contaminants, reduce their ability to move in the environment, and reduce the amount of contamination present.
- ***Short-term Effectiveness*** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
- ***Implementability*** considers the ease or difficulty of implementing an alternative and includes, among other things, technical feasibility, administrative feasibility, and availability of services and materials.
- ***Cost*** includes estimated capital and operation and maintenance costs expressed as present worth costs. Present worth cost is the total cost of an alternative over time in today's dollars.

MODIFYING CRITERIA

- ***State Acceptance*** considers whether the State concurs with, opposes, or has no comment on the Selected Remedies.
- ***Community Acceptance*** considers whether the community agrees with the Selected Remedies. This is assessed in detail in the ROD responsiveness summary (attached), which addresses public comments received on the Proposed Plan.

## 8.1 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents the results of comparative analyses of remedial alternatives for sites where further control of contamination is required.

Eleven of the subject sites (Sites 3, 6, 12, 17, 20, 24, 25, 26, 35, 40 and 42) have undergone interim removal actions. Eight of these sites (Sites 3, 20, 24, 25, 26, 35, 40 and 42) have been adequately mitigated to protect human health and the environment and require no further remediation. To ensure permanence, three removal action sites (Sites 6, 12, and 17) require land use restrictions, implemented by institutional controls (ICs). Remedial alternatives were evaluated for Site 19 with the ICs Alternative as the selected alternative. Sites 22, 23, and 30 did not show evidence of contamination caused by Air Force activities and do not require mitigation.

### 8.1.1 Site 6 Comparative Analysis of Alternatives

A comparative analysis was completed using the alternatives and criteria previously identified. The alternatives are:

- No Action; and
- ICs Alternative.

**Overall Protection of Human Health and the Environment.** The No Action Alternative would not provide for control of future risks by preventing exposure to landfill wastes or protect the engineered waste cells cap from damage by either human or natural causes. The ICs Alternative (i.e., land use restrictions) will prevent exposures by precluding any use of the site except as passive open space. There are no known residual wastes that present unacceptable risks on Site 6 outside of the engineered waste cells.

**Compliance With ARARs.** ARARs do not need to be addressed under the No Action Alternative. The ICs Alternative would comply with ARARs (Appendix C, Table C-1).

**Long-term Effectiveness and Permanence.** The No Action and ICs Alternatives provide no reduction in risk since contaminants are not actively removed. The No Action Alternative would not ensure the long-term effectiveness and permanence of the controls currently in place for the engineered waste cells at Site 6. The ICs Alternative long-term protects human health by restricting groundwater and land use, and provides controls to ensure the waste remains within the waste cells. Maintenance of the institutional controls under the ICs Alternative would ensure long-term effectiveness and permanence. The tools that will be used to ensure the long-term effectiveness of the institutional controls include monitoring for the statutorily required 5-year review, and the use of overlapping mechanisms to establish the controls and education of the stakeholders (property owners and the community). The waste cells were installed as part of a removal action and maintenance of the waste cells is being conducted under the approved Operation and Maintenance Work Plan (Tetra Tech, Inc and Black & Veatch, 1999). The active components of this alternative provides long-term effectiveness by ensuring the waste remains within the waste cells through maintenance of the waste cells.

**Reduction of Toxicity, Mobility, or Volume Through Treatment.** The No Action and ICs Alternatives do not actively reduce the toxicity, mobility or volume of contaminants. At Site 6, there are no known residual contaminants outside of the engineered waste cells that would cause risk to human health or the environment. The wastes placed within the waste cells were not hazardous wastes as defined by State or Federal regulations.

**Short-term Effectiveness.** The No Action and ICs Alternatives do not pose a risk to workers, residents, and the environment during implementation. It is estimated that approximately 6 months will be required to implement the IC Alternative.

**Implementability.** The No Action and ICs Alternatives are easy to implement. Use restrictions will be placed on property use to limit the exposure of individuals to residual contamination. Under the ICs Alternative, use restrictions will be placed on property use to either protect the integrity of the engineering/technical control and/or to limit the exposure of individuals to residual contamination. These use restrictions will be established using institutional controls, which are described in Sections 7 and 9. A layering strategy, which identifies and combines mutually reinforcing controls, is being used by the Air Force including: combinations of use restrictions in deeds, zoning maps, physical barriers, notices to the community, local permit systems, community master plans, and airport layout plans.

**Cost.** No Action is a no-cost alternative. The estimated annual cost for the ICs Alternative is $20,000 and includes monitoring, maintaining, notification, inspection and reporting of the institutional controls. The cost of landfill operation and maintenance (cap maintenance, groundwater monitoring, leachate collection/disposal, and reporting) is not included in the IC alternative. These existing, ongoing costs are estimated at $50,000 per year.

**State Acceptance.** The State of California was actively involved in the OU2 RI/FS and remedy selection process and participated in the public meetings held to inform the public of the Proposed Plan. While the State concurs with the OU2 RI/FS, final acceptance will occur with the concurrence of this AFRPA OU2 ROD.

**Community Acceptance.** The public comment period for the 2000 OU2 Proposed Plan was from August 23 through September 22, 2000. In addition, a public meeting was held on September 13, 2000. Representatives of the Air Force, EPA, and DTSC attended the public meeting to address questions concerning the OU2 RI/FS and 2000 OU2 Proposed Plan. A Responsiveness Summary is included as Appendix A.

### 8.1.2 Site 12 Comparative Analysis of Alternatives

A comparative analysis was completed using the alternatives and criteria previously identified. The alternatives are:

- No Action; and
- ICs Alternative.

**Overall Protection of Human Health and the Environment.** The No Action Alternative would not protect human health. Exposure by direct contact, ingestion and inhalation of dust particles would remain at current levels because the site would remain unprotected. Future residents and workers would remain at risk. The ICs Alternative will protect human health by limiting use of groundwater and preventing exposure to contaminated soil. Future land use will be restricted to non-residential uses. These actions would control risk by preventing exposures to the residual contamination.

***Compliance With ARARs.*** ARARs do not need to be addressed under the No Action Alternative. The ICs Alternative would comply with ARARs (Appendix C).

**Long-term Effectiveness and Permanence.** The No Action and ICs Alternatives provide no active reduction in risk since residual contamination is not removed. The No Action Alternative would not ensure the long-term effectiveness and permanence. The ICs Alternative protects human health by restricting groundwater use and land use. Maintenance of the institutional controls under the ICs Alternative would ensure long-term effectiveness and permanence.

**Reduction of Toxicity, Mobility, or Volume Through Treatment.** The No Action and ICs Alternatives do not actively reduce the toxicity, mobility or volume of contaminants in the groundwater or soil. Some contaminants may decrease in concentration with natural attenuation.

**Short-term Effectiveness.** The No Action and ICs Alternatives do not pose a risk to workers, residents, and the environment during implementation. It is estimated approximately 6 months will be required to implement the IC Alternative.

**Implementability.** The No Action and ICs Alternatives are easy to implement. Use restrictions will be placed on property use to limit the exposure of individuals to residual contamination. These use restrictions will be established using institutional controls: legal, governmental and administrative methods. A layering strategy which identifies and combines mutually reinforcing controls is being used by the Air Force including: combinations of use restrictions in deeds, zoning maps, physical barriers, notices to the community, local permit systems, community master plans, and airport layout plans.

**Cost.** No Action is a no-cost alternative. The estimated annual cost for the ICs Alternative is $6,000 and includes monitoring, maintaining, notification, inspection and reporting of the institutional controls.

**State Acceptance.** The State of California was actively involved in the OU2 RI/FS and remedy selection process and participated in the public meetings held to inform the public of the Proposed Plan. While the State concurs with the OU2 RI/FS, final acceptance will occur with the concurrence of this AFRPA OU2 ROD.

**Community Acceptance.** The public comment period for the 2000 OU2 Proposed Plan was from August 23 through September 22, 2000. In addition, a public meeting was held on September 13, 2000. Representatives of the Air Force, EPA, and DTSC attended the public meeting to address questions concerning the OU2 RI/FS and 2000 OU2 Proposed Plan. A Responsiveness Summary is included as Appendix A.

### 8.1.3 Site 17 Comparative Analysis of Alternatives

A comparative analysis was completed using the alternatives and criteria previously identified. The alternatives are:

- No Action; and
- ICs Alternative.

**Overall Protection of Human Health and the Environment.** The No Action and ICs Alternatives will not actively reduce the risk posed by contaminated soil. The No Action Alternative would not protect human health. Exposure by direct contact, ingestion and inhalation of dust particles would remain at current levels because the site would remain unprotected. Future construction workers would remain at risk. The ICs Alternative will protect human health by preventing exposure to contaminated soil protecting human health. Future land use will be restricted. These actions would control risk by preventing exposures to the residual contamination.

**Compliance With ARARs.** ARARs do not need to be addressed under the No Action Alternative. The ICs Alternative would comply with ARARs (Appendix C).

**Long-term Effectiveness and Permanence.** The No Action and ICs Alternatives provide no active reduction in risk since contaminants are not removed. The No Action Alternative would not ensure the long-term effectiveness and permanence. The ICs Alternative provides long-term protection of human health by restricting land use. Maintenance of the institutional controls under the ICs Alternative would ensure long-term effectiveness and permanence. The tools that will be used to ensure the long-term effectiveness of the institutional controls include monitoring for the statutorily required 5-year review and the use of overlapping mechanisms to establish the controls and education of the stakeholders (property owners and the community).

**Reduction of Toxicity, Mobility, or Volume Through Treatment.** The No Action and ICs Alternatives do not actively reduce the toxicity, mobility or volume of contaminants in the soil. However, PCBs are not mobile contaminants and are not expected to migrate.

**Short-term Effectiveness.** The No Action and ICs Alternatives do not pose a risk to workers, residents, and the environment during implementation. It is estimated that approximately 6 months will be required to implement the IC Alternative.

**Implementability.** The No Action and ICs Alternatives are easy to implement. Use restrictions will be placed on property use to limit the exposure of individuals to residual contamination. Use restrictions will be placed on property use to limit the exposure of individuals to residual contamination. These use restrictions will be established using institutional controls: legal, governmental and administrative methods. A layering strategy, which identifies and combines mutually reinforcing controls, is being used by the Air Force including: combinations of use restrictions in deeds, zoning maps, physical barriers, notices to the community, local permit systems, community master plans, and airport layout plans.

**Cost.** No Action is a no-cost alternative. The estimated annual cost for the ICs Alternative is $6,000 and includes monitoring, maintaining, notification, inspection and reporting of the institutional controls.

**State Acceptance.** The State of California was actively involved in the OU2 RI/FS and remedy selection process and participated in the public meetings held to inform the public of the Proposed Plan. While the State concurs with the OU2 RI/FS, final acceptance will occur with the concurrence of this AFRPA OU2 ROD.

**Community Acceptance.** The public comment period for the 2000 OU2 Proposed Plan was from August 23 through September 22, 2000. In addition, a public meeting was held on September 13, 2000. Representatives of the Air Force, EPA, and DTSC attended the public meeting to address questions concerning the OU2 RI/FS and 2000 OU2 Proposed Plan. A Responsiveness Summary is included as Appendix A.

### 8.1.4 Site 19 Comparative Analysis of Alternatives.

A comparative analysis was completed of applicable alternatives against the selection criteria described above. The evaluated alternatives for cleanup of surface and near-surface soils are:

- No Action;
- ICs Alternative;
- Excavation and Off-Base Disposal; and
- Excavation and Off-Base Incineration.

**Overall Protection of Human Health and the Environment.** The No Action Alternative would not protect human health. Chances of ingestion and inhalation of dust particles would remain because the soil surface would remain unprotected. Construction workers and potential future residents would be at risk. The ICs Alternative will provide protection of human health and the environment, because no use of the property is allowed.

The excavation and off-Base disposal or incineration alternatives would provide adequate protection of human health and the environment by removing the source. No treatment would take place with landfill disposal, but the elimination of the source would reduce the risk to future site receptors through inhalation or ingestion of dust particles at the site. Excavation and treatment by incineration would reduce risks by destruction of contaminants.

**Compliance with ARARs.** ARARs do not need to be addressed under the No Action Alternative. The ICs Alternative would comply with the ARARs (Appendix C).

**Long-term Effectiveness and Permanence.** The No Action Alternative does not provide a mechanism to prevent direct access to contaminated soils and will not provide long-term effectiveness and permanence of risk reduction. The ICs Alternative would restrict land use. Access controls are already in place and would be maintained under the ICs Alternative. Maintenance of all institutional controls under the ICs Alternative would provide long-term effectiveness and permanence. Excavation and ex-situ alternatives would eliminate the risk of human exposure by removing the soil to an off-Base landfill or destroy contaminants by incineration. Both excavation and disposal off the Base or incineration provide long-term effectiveness and permanence of risk reduction at the site. The tools that will be used to ensure the long-term effectiveness of the institutional controls include monitoring for the statutorily required 5-year review, and the use of overlapping mechanisms to establish the controls and education of the stakeholders (property owners and the community).

**Reduction of Toxicity, Mobility, and Volume Through Treatment.** The No Action and ICs Alternatives would provide no reduction of toxicity, mobility, or volume through treatment because no treatment system would be implemented at the site. Off-Base landfilling would reduce the mobility of the contaminants at Site 19 by removing the contaminants from the site and placing them in an engineered landfill. No contaminated soil would remain on the site reducing contaminant toxicity and volume at the site. This alternative, however, would not include any treatment of the contaminants. Incineration would reduce the toxicity, mobility, and volume of contaminants.

**Short-term Effectiveness.** The No Action and ICs Alternatives would not present short-term risk to workers because no excavation or treatment would be implemented for these alternatives. It is estimated that approximately 6 months will be required to implement the IC Alternative. In the Excavation and Off-Base Disposal or Incineration Alternatives, worker protection during excavation, transportation and treatment poses a minor concern. Engineering controls can be used for worker protection (i.e., dust suppression, hearing protection) and therefore, the short-term risks are judged to be controllable. Community risks presented as a result of the transportation of the soils either on-Base or off-Base, are considered negligible. Incineration presents a risk of contaminated air emissions; however, these can be controlled. Excavation and Off-Base Disposal or Incineration Alternatives are estimated to require one year for implementation.

**Implementability.** The No Action and ICs Alternatives are easily implemented. Use restrictions will be placed on property use to either protect the integrity of the engineering/technical control and/or to limit the exposure of individuals to residual contamination. These use restrictions will be established using institutional controls: legal, governmental and administrative methods. A layering strategy, which identifies and combines mutually reinforcing controls, is being used by the Air Force including: combinations of use restrictions in deeds, zoning maps, physical barriers, notices to the community, local permit systems, community master plans, and airport layout plans.

Excavation and off-site incineration would involve excavation and backfilling. Permitted off-Base Class II landfills and incinerators are available. No sophisticated equipment or materials would be needed to implement the Off-Base Disposal Alternative. Construction and safety procedures would be simple, and a number of experienced contractors are available who could perform this type of work. Construction delays would be unlikely. Use of an off-Base incinerator would require trial burns

**Cost.** The No Action and ICs Alternatives are very cost effective, with no cost for No Action and an estimated annual cost of $7,000 for the ICs Alternative. The costs for the ICs Alternative include monitoring, maintaining, notification, inspection and reporting of the institutional controls. Excavation and Off-Base Incineration is the highest cost alternative, at $3,772,800, with Excavation and Off-Base Disposal only slightly less expensive, at $3,402,700. These costs would be one-time only costs.

**State Acceptance.** The State of California was actively involved in the OU2 RI/FS and remedy selection process and participated in the public meeting held to inform the public of the Proposed Plan. While the State concurs with the recommendations in OU2 RI/FS, final State acceptance will occur with the concurrence of this AFRPA OU2 ROD.

**Community Acceptance.** The public comment period for the 2000 OU2 Proposed Plan was from August 22 through September 22, 2000. In addition, a public meeting was held on September 13, 2000. Representatives of the Air Force, EPA, and DTSC attended the public meeting to address questions concerning the OU2 RI/FS and 2000 OU2 Proposed Plan. A Responsiveness Summary is included as Appendix A.

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# DECISION SUMMARY:
# 9.0 - SELECTED REMEDIES

# 9.0 SELECTED REMEDIES

Selected groundwater and soil remedies will limit exposures or meet the cleanup standards. The selected remedial alternative for the sites requiring action is the ICs Alternative. In addition, the operations, maintenance, and monitoring of the engineered waste cells at Site 6 and groundwater monitoring at Site 12 will continue. The ICs will limit exposure of contaminants to future landowner(s) and/or user(s) and to maintain the integrity of the existing engineering controls

Descriptions of the required actions and restrictions on activities for Sites 6, 12, 17 and 19 are provided in *site-specific discussions below and in Section 7 of this ROD. The required actions and restrictions are* intended to apply to affected areas, not necessarily to the entire sites as originally defined in the feasibility study. Affected areas are areas where hazardous substances remain at levels that make the property unsuitable for unrestricted use. Legal descriptions of the affected areas and monitoring well locations associated with Sites 6 and 12 will be included in deeds or letters of transfer for each parcel. Survey of monitoring well locations and settlement monuments for purposes of identifying their locations in the deed and State land use covenant will occur prior to property transfer. Except for restrictions related to groundwater extraction and use, that portion of the property that is not within the affected area will not be restricted or otherwise constrained by institutional controls. The groundwater use prohibition applies to the entirety of the parcels containing Site 6 and Site 12.

The following sites at March AFB will be restricted by ICs. The indented language in Sections 9.1, 9.2, 9.3, and 9.4 ("Restrictions") will be in incorporated into (a) each deed transferring all or any part of any of the listed sites from the Air Force to a non-federal entity and a state land use covenant to be recorded in the land records of the County of Riverside prior to recording of the deed, or (b) the base management plan (or equivalent document) of any federal entity that accepts all or any part of one of the sites from the Air Force.

## 9.1 SELECTED REMEDY FOR SITE 6 - LANDFILL NO. 4

At Site 6, contamination, consisting of non-hazardous wastes from old landfills is consolidated in engineered waste cells in accordance with the final *Closure/Post Closure Maintenance Plan, Site 6, OU 2 March Air Force Base*, May 1995 and the *Final Closure/Post Closure Maintenance plan, Site 6, OU-2, Cell B Expansion, March Air Force Base,* September 1995. Site use, access, and activity restrictions will protect the cover and associated drainage and monitoring systems of the engineered waste cells of this consolidated, non-hazardous waste landfill. Hazardous substance contamination found at the site before construction of the engineered waste cells was removed and disposed of before construction. The use, access, and activity restrictions will protect persons from exposure to the wastes in the engineered cells. A prohibition on the extraction and use of groundwater under the Property will prevent exposure to contaminated groundwater.

The ICs Alternative is the selected remedy for Site 6. Land use restrictions will be incorporated in the deed as grantee covenants. In the State Land Use covenant, the restrictions will be expressed in a different format, but they will be consistent with the grantee covenants in the deed. As presented in Section 7.2.1, this remedy adds ICs to the continuing operations, maintenance and monitoring of the Site 6 landfill as specified in the existing, regulatory approved O&M Plan (Tetra Tech, Inc and Black & Veatch, 1999). The selected remedy is consistent with the anticipated future land use for Site 6 as passive open space (March JPA, 2003)

- Grantee covenants and agrees that it will not use Site 6 for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day care centers for children.

- Grantee covenants and agrees that it will not conduct or allow others to conduct any construction, excavation, drilling, grading, removal, trenching, filling earth movement, mining, and planting that would disturb the soil or the landfill cover, including the vegetative cap, or the injection or release of water or other fluids except for the purpose of monitoring groundwater or landfill gas.

- Grantee covenants and agrees that it will not extract groundwater from the property for any purpose other than monitoring.

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would cause disturbance or removal of fencing or signs intended to exclude the public from the landfill.

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would cause the surface application of water (e.g. irrigation) to the extent that the integrity of the landfill is impacted and injection of water or other fluids that might affect groundwater flow direction.

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would cause disturbance of any landfill equipment or systems, including the leachate collection system, the groundwater monitoring systems, and settlement monuments; or that could affect the drainage, sub-drainage, or erosion controls for the landfill cover.

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that limit access to any landfill equipment and systems, including the leachate collection system, the groundwater monitoring systems, settlement monuments, or the drainage, sub-drainage, or erosion controls for the landfill cover.

## 9.2 SELECTED REMEDY FOR SITE 12 - CIVIL ENGINEERING YARD

At Site 12, residual petroleum hydrocarbon contamination remains near a washbasin. Confirmation sampling demonstrated that the metals cadmium and chromium were removed to below Industrial PRGs, but remain above Residential PRGs. However, the risk was found to be within the risk range identified in the NCP and no use restrictions are required. Restrictions on construction and other activities will reduce the risk of destruction of, or limitation on access to, groundwater monitoring wells on the site. A prohibition on the extraction and use of groundwater under the Property will prevent potential exposure to contaminated groundwater. No ICs are required for the petroleum hydrocarbon contamination, because the contamination levels are acceptable for unrestricted use.

The ICs Alternative is the selected remedy for Site 12. Land use restrictions will be incorporated into the letter of transfer to another federal agency as conditions of the transfer or in the deed to a non-federal entity as grantee covenants in the form below. In the State Land Use covenant, the restrictions will be expressed in a different format, but they will be consistent with the grantee covenants in the deed. As presented in section 7.2.2, groundwater monitoring at Site 12 will continue as specified in the "Quality Program Plan - Long-Term Groundwater Monitoring, Long-Term Operation, and Long-Term Operation and Maintenance Programs, March ARB, California" (September 2000), as amended and supplemented. The selected remedy is consistent with the anticipated future land use for Site 12 as mixed use (March JPA, 1999).

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would cause disturbance of any equipment or systems associated with groundwater monitoring.

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would limit access to any equipment or systems associated with groundwater monitoring.

- Grantee covenants and agrees that it will not extract groundwater from the property for any purpose other than monitoring.

### 9.3 SELECTED REMEDY FOR SITE 17 - SWIMMING POOL FILL

At Site 17, low levels of PCBs are present in soils at least 8 feet beneath the ground surface. No PCB contamination has been found in the groundwater. A prohibition on use of the property for residential, school, day care, or hospital use will reduce to acceptable levels human exposure to the low-level, residual contamination from PCBs that were previously disposed of in an abandoned swimming pool on the site. The pool and all but some low-level residual soil contamination were excavated and disposed of in a previous removal action. A prohibition against drilling or excavation more than 7 feet below current ground surface will prevent possible on-site exposure or off-site migration of the contaminated soils.

The ICs Alternative is the selected remedy for Site 17. Land use restrictions will be incorporated in the deed as grantee covenants. In the State Land Use Covenant, the restrictions will be expressed in a different format, but they will be consistent with the grantee covenants in the deed. As presented in Section 7.2.3, the selected remedy is consistent with the anticipated future land use for Site 17 as part of the Green Acres Historic District (March JPA, 1999).

- Grantee covenants and agrees that it will not use Site 17 for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day care centers for children.

- Grantee covenants and agrees that it will not conduct or allow others to conduct any activity that will disturb the soil at or below 7 feet below ground surface

### 9.4 SELECTED REMEDY FOR SITE 19 - WEST MARCH SLUDGE DRYING BEDS

In the past at Site 19, sludge from the wastewater treatment facility was spread in unlined drying beds. Surface and near-surface soils contaminated with PAHs, PCBs, hexavalent chromium, and thallium were found sporadically throughout the site. A prohibition on use of the property for residential, school, day care, or hospital use and restrictions on soil disturbance activities during any future construction will prevent unacceptable levels of human exposure to the low-level, residual contamination.

The ICs Alternative is the selected remedy for Site 19. Land use restrictions will be incorporated in the deed as grantee covenants. In the State Land Use Covenant, the restrictions will be expressed in a different format, but they will be consistent with the grantee covenants in the deed. As presented in Section 7.2.4, the selected remedy is consistent with the anticipated future land use for the parcel surrounding Site 19 as a wastewater treatment plant (March JPA, 2003).

- Grantee covenants and agrees that it will not use Site 19 for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day care centers for children.

- Grantee covenants and agrees that it will not conduct or allow others to conduct any activity that would disturb the soil in the former sludge drying pits.

- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would result in removal, disturbance, or other interference with fences or other barriers to access to or signs notifying the public of Site 19.

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# DECISION SUMMARY:
# 10.0 - STATUTORY DETERMINATIONS

# 10.0 STATUTORY DETERMINATIONS

Under the authority delegated to it by Executive Order 12580, the Air Force is selecting remedial actions at theses sites with the concurrence of EPA and the State, that achieve adequate protection of human health and the environment. Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedies meet these statutory requirements.

## 10.1 SITE 6 SOIL AND GROUNDWATER - ICS ALTERNATIVE

***Protection of Human Health and the Environment.*** The selected remedy protects human health and the environment prohibiting activities which would interfere with the integrity of the cap, limiting exposure to materials contained within the engineered waste cells, maintaining the waste cells and associated systems, and monitoring for potential releases from the engineered waste cells as discussed in Section 9.0. Principal threats identified during the OU2 RI were addressed in the removal action. The IC/land use restrictions will protect the waste containment system (cap and liner), which limit the threat of exposure via direct contact and ingestion. Monitoring will be conducted to detect any migration from the engineered waste cells. Until land transfer, the AFRPA will continue to enforce procedures for protection of the site and perform any required on-going maintenance. The Federal deed(s) will retain a right of access for the Air Force, USEPA, and the State for monitoring, maintenance and inspection of the remedy, and any necessary environmental investigations.

***Compliance with Applicable or Relevant and Appropriate Requirements.*** The selected remedy complies with all ARARs (refer to Appendix C)

***Cost Effectiveness.*** In the judgment of the Air Force, the selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria of protectiveness of human health and the environment and compliance with ARARs. Overall effectiveness was evaluated by assessing, in combination, long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and thus this alternative represents a reasonable value for the money to be spent. The estimated annual cost of ICs and State Land Use Covenant (SLUC) shows the ICs Alternative is a cost-effective method of protecting the engineered waste cells and controlling exposures at Site 6.

***Utilization of Permanent Solutions and Alternative Treatment Technologies (for Resource Recovery Technologies) to the Maximum Extent Practicable.*** The selected remedy does not utilize permanent solutions or alternative treatment technologies, but appropriately balances those considerations with relative costs and other relevant criteria.

The selected remedy achieves the objectives of protecting the engineered waste cells and limiting exposures to levels protective of human health, while allowing the possibility of some future use. The selected remedy satisfies the long-term effectiveness criteria by limiting exposures to the waste and restricting groundwater use. The selected remedy does not present short-term risks and there are no implementability issues.

***Preference for Treatment as a Principal Element.*** The selected remedy does not satisfy the statutory preference for remedies that employ treatment as a principal element. The wastes in the engineered waste cells cannot be practicably removed and treated. Therefore, limiting exposures by ICs and a SLUC is appropriate.

***Five-Year Review Requirements.*** Because the remedy will result in maintaining the engineered waste cells in a manner to prevent migration and exposures, a statutory review of this site will be conducted as part of the ongoing CERCLA five-year reviews to ensure that the remedy remains protective of human health and the environment.

## 10.2 SITE 12 SOIL AND GROUNDWATER - ICS ALTERNATIVE

***Protection of Human Health and the Environment.*** The selected remedy protects human health and the environment by limiting exposure to residual contamination by the method discussed in Section 9.0. Principal threats identified during the OU2 RI were addressed in the removal action. The controls on land and groundwater use will limit the threat of exposure via direct contact or ingestion. As an active component of the remedy, groundwater monitoring will be conducted to evaluate the migration and concentration of the contaminants in groundwater. Until land transfer, the AFRPA will continue to enforce procedures for protection of the site and perform any required ongoing maintenance. The Federal deed(s) will retain a right of access for the Air Force, EPA, and the State for monitoring, maintenance and inspection of the remedy, and any necessary environmental investigations.

***Compliance with Applicable or Relevant and Appropriate Requirements.*** The selected remedy will comply with all ARARs (refer to Appendix C).

***Cost Effectiveness.*** In the judgment of the Air Force, the selected remedy is cost-effective and represents a reasonable value for the money to be spent. The method for this determination was as discussed in Section 10.1 above. The annual cost of ICs shows the ICs Alternative is a cost-effective method of controlling exposures at Site 12.

***Utilization of Permanent Solutions and Alternative Treatment Technologies (for Resource Recovery Technologies) to the Maximum Extent Practicable.*** The selected remedy does not utilize permanent solutions or alternative treatment technologies, but appropriately balances those considerations with relative costs and other relevant criteria.

The selected remedy achieves the objective of limiting exposures to levels protective of human health while allowing commercial use of the site. The selected remedy satisfies the long-term effectiveness criteria by limiting exposures to contaminated soil and restricting groundwater use. The selected remedy does not present short-term risks and there are no implementability issues.

***Preference for Treatment as a Principal Element.*** The selected remedy does not satisfy the statutory preference for remedies that employ treatment as a principal element. The residual contamination remaining after the removal action cannot be practicably removed and treated. Therefore, limiting exposures by ICs and SLUC is appropriate.

***Five-Year Review Requirements.*** Because the remedy will result in soil and groundwater contamination remaining on the site above levels that allow for unlimited use and unrestricted exposure, a statutory review of this site will be conducted as part of the ongoing CERCLA five-year reviews to ensure that the remedy remains protective of human health and the environment.

## 10.3 SITE 17 SUBSURFACE SOILS - ICS ALTERNATIVE

***Protection of Human Health and the Environment.*** The selected remedy protects human health and the environment by limiting exposure to residual contamination by the method discussed in Section 9.0. Principal threats identified during the OU2 RI were addressed in the removal action. The controls on land use will limit the threat of exposure via direct contact or ingestion. Until land transfer, the AFRPA will continue to enforce procedures for protection of the site. The Federal deed(s) will retain a right of access for the Air Force, EPA, and the State for monitoring, maintenance and inspection of the remedy, and any necessary environmental investigations.

***Compliance with Applicable or Relevant and Appropriate Requirements.*** The selected remedy will comply with all ARARs (refer to Appendix C).

***Cost Effectiveness.*** In the judgment of the Air Force, the selected remedy is cost-effective and represents a reasonable value for the money to be spent. The method for this determination was as discussed in Section 10.1 above. The annual cost of ICs and SLUC shows the ICs Alternative is a cost-effective method of controlling exposures at Site 17.

***Utilization of Permanent Solutions and Alternative Treatment Technologies (for Resource Recovery Technologies) to the Maximum Extent Practicable.*** The selected remedy does not utilize permanent solutions or alternative treatment technologies, but appropriately balances those considerations with relative costs and other relevant criteria.

The selected remedy achieves the objective of limiting exposures to levels protective of human health while allowing some use of the site. The selected remedy satisfies the long-term effectiveness criteria by limiting exposures to contaminated soils. The selected remedy does not present short-term risks and there are no implementability issues.

***Preference for Treatment as a Principal Element.*** The selected remedy does not satisfy the statutory preference for remedies that employ treatment as a principal element. The residual contamination remaining after the removal action cannot be practicably removed and treated. Therefore, limiting exposures by ICs and SLUC is appropriate.

***Five-Year Review Requirements.*** Because the remedy will result in soil contamination remaining on the site above levels that allow for unlimited use and unrestricted exposure, a statutory review of this site will be conducted as part of the ongoing CERCLA five-year reviews to ensure that the remedy remains protective of human health and the environment.

## 10.4 SITE 19 SURFACE AND NEAR-SURFACE SOILS - ICS ALTERNATIVE

***Protection of Human Health and the Environment.*** The selected remedy protects human health and the environment by limiting exposure to soil contamination by the method discussed in Section 9.0. The controls on land use and site access will limit the threat of exposure via direct contact or ingestion. Until land transfer, the AFRPA will continue to enforce procedures for protection of the site. The Federal deed(s) will retain a right of access for the Air Force, EPA, and the State for monitoring, maintenance and inspection of the remedy, and any necessary environmental investigations.

***Compliance with Applicable or Relevant and Appropriate Requirements.*** The selected remedy will comply with all ARARs (refer to Appendix C).

***Cost Effectiveness.*** In the judgment of the Air Force, the selected remedy is cost-effective and represents a reasonable value for the money to be spent. The annual cost of ICs and LUC shows the ICs Alternative is a cost-effective method of controlling exposures at Site 19. The Excavation and Off-Base Disposal and Excavation and Off-Base Incineration Alternatives, which are significantly more expensive (each over three million dollars) than the ICs and SLUC, would allow unrestricted use of the site. However, with the expected future use as a public wastewater treatment facility, the additional expense would not return a reasonable value for the money spent. The method for this determination was as discussed in Section 10.1 above.

***Utilization of Permanent Solutions and Alternative Treatment Technologies (for Resource Recovery Technologies) to the Maximum Extent Practicable.*** The selected remedy does not utilize permanent solutions or alternative treatment technologies, but appropriately balances those considerations with relative costs and other relevant criteria.

The selected remedy achieves the objective of limiting exposures to levels protective of human health while allowing use of the site as a public wastewater treatment facility. The selected remedy satisfies the long-term effectiveness criteria by limiting exposures to contaminated soils. The selected remedy does not present short-term risks and there are no implementability issues. The Excavation and Off-Base Disposal and Excavation and Off-Base Incineration Alternatives would provide a permanent solution, but costs are significant.

***Preference for Treatment as a Principal Element.*** The selected remedy does not satisfy the statutory preference for remedies that employ treatment as a principal element. Removal of soil and treatment or disposal off-Base cannot be performed in a cost-effective manner. Therefore, limiting exposures by ICs and SLUC is appropriate.

***Five-Year Review Requirements.*** Because the remedy will result in soil contamination remaining on the site above levels that allow for unlimited use and unrestricted exposure, a statutory review of this site will be conducted as part of the ongoing CERCLA five-year reviews to ensure that the remedy remains protective of human health and the environment.

# DECISION SUMMARY:
# REFERENCES

# REFERENCES


AFRPA/DD-March

2000 Letter from Mary Bridgewater, Regional BRAC Environmental Coordinator, to Melissa Pennington, US EPA Region 9, August 23, 2000.

The Earth Technology Corporation

2000 *Draft Final Site 42 Treatability Study Report*. Prepared by Earth Tech, Inc. for USAF Air Mobility Command, Scott AFB, Illinois.

IT Corporation

1996 *Removal of Wastes at Site 26, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997a *Removal of Wastes at Site 6c and 6d, OU2a, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997b *Removal of Wastes at Site 3, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997c *As-Built Construction Report, OU2, Site 6a, March Air Force Base*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997d *Removal of Wastes at Site 6b' and 6b (Quarry), OU2, March Air Force Base Closure Report* Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska

1997e *Removal of Wastes at Site 12, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997f *Removal of Wastes at Site 20/26B, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997g *Removal of Wastes at Site 24, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997h *Site 25 Closure Report, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

1997i *Removal of Wastes at Site 26A, OU2, March Air Force Base Closure Report*. Prepared by IT Corporation for the U.S. Army Corps of Engineers, Omaha, Nebraska.

OHM Remediation Services Corporation

1995 *Final Report Time Critical Removal Action-Site 40 at March Air Force Base California*. Prepared for U.S. Army Corps of Engineers, Omaha, Nebraska.

1996 *Draft Field Summary Report-Remedial Action at Installation Restoration Program Site 30, March Air Force Base, Riverside, California*. Prepared for Air Force Center for Environmental Excellence, Brooks AFB, Texas.

Parsons Engineering Science

1997 *Draft Site Closure Report, IRP Site 35c Former Diesel UST Site.* Prepared for Air Force Center for Environmental Excellence Technology Transfer Division, Brooks Air Force Base, Texas. Prepared for U.S. Army Corps of Engineers, Sacramento, California.

Tetra Tech, Inc.

1994 *Summary of Subsurface Investigation and Removal Action for March Air Force Base Operable Unit 2 Site 17.* Prepared for U.S. Army Corps of Engineers, Sacramento, California.

1997a *Operable Unit 2, Remedial Investigation/Feasibility Study.* Prepared for Air Force Center for Environmental Excellence, Brooks Air Force Base, Texas.

1997b *Trend Analysis* Prepared for Headquarters Strategic Air Command, Environmental Compliance Division, Offutt Air Force Base, Nebraska.

U.S. EPA

1991 *Risk Assessment Guidance for Superfund Volume 1, Part B. Development of Risk-Based Preliminary Remediation Goals.*

1997 Ecological Risk Assessment Guidance

1999 Region 9 Preliminary Remediation Goals.

# APPENDIX A - RESPONSIVENESS SUMMARY

# APPENDIX A - RESPONSIVENESS SUMMARY

## Operable Unit 2 (OU2) Air Force Base Conversion Agency Sites March Air Force Base, California

## RESPONSIVENESS SUMMARY

### RESPONSIVENESS SUMMARY 1997 PROPOSED PLAN

#### OVERVIEW

Air Force Base Conversion Agency Site at Operable Unit 2 (OU2) is a group of 15 sites on March Air Force Base, California. Initial investigation identified these 15 sites as possibly contaminated and requiring soil and/or groundwater cleanup. Further investigation revealed that four of the sites did not require cleanup. Of the sites found to require remediation, seven were cleaned up with removal actions during the Remedial Investigation/Feasibility Study (RI/FS) phase. The four remaining sites included one that required action for both soil and groundwater, one that requires protection of waste cells constructed during removal actions, and two that required action for only soil. Institutional controls will be implemented at these sites requiring action.

Judging from the comments made at the public hearing for the Proposed Plan, and at various Restoration Advisory Board (RAB) and other public meetings held throughout the course of the RI/FS, the community supports the chosen cleanup alternatives. The earlier removal actions, including the consolidation of several landfill sites into two new, sealed and capped waste cells (Site 6), have also been supported.

This Responsiveness Summary includes the following sections:

I. Background on Community Involvement and Concerns
II. Summary of Comments Received During the Public Comment Period and the Air Force Responses
Comments from the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) and Air Force Responses
Comments from the Public and Air Force Responses
III Community Relations Activities at OU2

#### BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The investigations and various removal actions at OU2 sites have not generated any negative reaction from the community. Open houses, workshops, and public meetings were sparsely attended. Public comment periods for the Draft RI and FS, and for various Engineering Evaluations/Cost Analyses (EE/CAs) for removal actions, did not receive responses from the public. The RAB, which at one point met every month, was kept apprised of and discussed the ongoing investigations and planned cleanup activities. In addition, RAB subcommittees reviewed and reported on some of the cleanup documents, such as the EE/CAs. Although the discussion and questions demonstrated a keen interest in the cleanup, no objections were raised to the chosen remedial measures. The primary concern was March's ability to get funding for the cleanup--for the entire base, not just at OU2.

The only removal action that brought significant community response was the Site 6 landfill consolidation, which is adjacent to Air Force Village West (AFVW), a private residential community. This site was designated for reuse by the community as a recreational area. Some concerns were voiced about the height of the new cells and their visibility from the housing area. The Air Force response was that the area had been the site of three previously existing, open dumps, and the removal action restored it to a clean and usable condition. At a public meeting to discuss adding wastes from other IRP sites to one of the cells, the Executive Director of the Joint Powers Authority asked for additional fill material on top of the liner to allow the installation of light poles and parking lots. He also requested that the AFVW access road used by the construction vehicles be cleaned up to its original condition after the work was finished. The Air Force agreed to both requests.

## RESPONSE TO COMMMENT FOR 2000 AFBCA OU2 PROPOSED PLAN

Comments from the public and Air Force Responses

**Comment:** I'm completely satisfied that this plan addresses all the issued of the community, specifically when you look at the statistics and the risk assessment Being a cancer survivor (hope to be), I can tell you that I've seen statistics much higher than this. These are not only acceptable risks, but to me, they're insignificant. Therefore, I'm in complete agreement with this particular plan.

**Air Force Response:** Thank you.

**Comment:** Regarding Site 6, Landfill 4, I would suggest another restriction on this site. That would be "use of the site for passive or active recreation is not recommended " In my experience there have been problems with redeveloping landfills as ballparks and picnic areas, with methane gas generation and collapsing soils, and there is also the possibility of some damage to the (landfill) cap. Since there is so much space available on the base, this landfill should have some restriction on it.

**Air Force Response:** There are restrictions on the landfill to control the recreational activities so as not to damage Site 6's engineered cap. For example, dirt bikes will not be allowed, but ball fields will. An additional three feet of soil were added to the landfill cap to allow for the ballfield use. The slope of the cap was also at a 3% slope to ensure cap drainage but yet allow the ball field usage. Methane is not a problem on Site 6, since the waste is so old. Computer modeling was done knowing the age of the waste; the results show that the methane generation is at a minimum. That is why a methane destruction system, a flare, was not built.

**Comment:** It (the Proposed Plan) has stated that access to the Site 6 landfill would be controlled. Is that permanent or only until some reuse of the site is considered?

**Air Force Response:** This is permanent control. This control is placed to restrict the recreational usage to allow only activities that do not damage the cap

**Comment:** Was any landfill gas monitoring or venting deemed necessary for the Site 6 landfill? Is that or should it be an issue?

**Air Force Response:** Methane is not a problem on Site 6, since the waste is old. Computer modeling was done knowing the age of the waste; the results show that the methane generation is at a minimum. That is why a methane destruction system, a flare, was not built.

**Comment:** Is the Site 6 landfill in an area of rising groundwater? If so, is there a possibility of groundwater coming into contact with the base of the landfill in such a way as to break the (landfill) liner?

**Air Force Response:** The ground water level at Site 6 changes seasonally. Groundwater levels rise in wet seasons and fall when it is dry. A subdrain system was engineered beneath the Site 6 cells. The subdrain system piping is made of perforated piping underneath the bottom liner, which directs the ground water away from the liner and into the Van Buren ditch.

**Comment:** Concerning long-term monitoring at the Site 6 landfill by the Air Force, is there going to be a separate analysis of groundwater levels?

**Air Force Response:** There are a total of six ground water monitoring wells in the vicinity of Site 6. These wells are used to monitor the ground water levels in addition to monitoring for known non-hazardous contaminants in the land fill to ensure the integrity of the liner is still intact.

**Comment:** If there is any significant change in conditions at the Site 6 landfill, such as gas or groundwater, will the Air Force be responsible for additional actions or the new owner?

**Air Force Response:** The Air Force will be responsible unless the damage is due to the fault of the new owner.

**Comment:** Regarding Site 12, the Civil Engineering Yard, Site 17, swimming pool, and Site 19, sludge drying beds; is there any recommendation that these sites be paved, newly paved or repaved for future use as commercial or industrial sites?

**Air Force Response:** There is no environmental need for any of these sites to be paved.

**Comment:** If this is some kind of remediation, would the Air Force consider doing this or leave it to the new owner or operator of the sites to pave it over?

**Air Force Response:** There is no environmental need for any of these sites to be paved. The new owner can choose to pave over them.

**Comment:** Would the Air Force at least provide the minimal acreage at each site recommended to be paved and cost estimates for paving to give to a new user or owner of the site?

**Air Force Response:** Acreage has been provided in the Record of Decision.

**Comment:** The work so far shows that the risks are acceptable for the uses proposed for these sites, but what if the risks are not acceptable to an adjacent potential operator or owner of a site?

**Air Force Response:** The use of adjacent sites was considered in the development of the restrictions.

**Comment:** Would the Air Force consider the development and use of buffer zones around some of these sites where there is still some contamination, cost to be negotiated between the Air Force and the new owners.

**Air Force Response:** The use of adjacent sites was considered in the development of the restrictions, therefore, buffer zones are not necessary. Only the sites themselves need to be restricted.

**Comment:** This whole report implies a new zoning scheme. There are some definitions proposed here, such as "unrestricted use." How is that defined? Does it mean residential, commercial/industrial?

**Air Force Response:** Unrestricted means the site could be used for any purpose including residential. There are no restrictions.

**Comment:** Does this land-use scheme jive with what the Joint Powers Authority in its Base Reuse Plan and Environmental Impact Report in 1997? How is this new information going to be coordinated with the overall land-use plan of the base?

**Air Force Response:** The land uses have been coordinated with the Joint Powers Authority. They understand the limitations on the restricted areas.

**Comment:** When are they planning on dealing with zoning issues?

**Air Force Response:** When they get ready to develop the property.

**Comment:** How does the taxpaying public make sure that the proper zoning is applied to these properties to assure public safety and how do we have a say in who the property ends up with?

**Air Force Response:** The Air Force has entered into Land Use Covenant with the State of California to ensure these restrictions are enforced. The use restrictions will be clearly stated in our deed(s), and will remain as a "cloud" in any future deed transfers.

**Comment:** We're discussing is the Proposed Plan; which contaminants were here, if and when they were removed; how will remaining hazards addressed and are they appropriately addressed by this particular plan. In my opinion, they are. Most zoning questions will be

addressed with those who will utilize the land later on when it's transferred with those restrictions assigned by the appropriate agencies. I'm sure that those agencies are not going to let anything go unless the public is safeguarded.

**Air Force Response:** You are correct. That is why we have the Institutional Controls and the Land Use Covenants. Zoning is actually the responsibility of your local community's zoning committee. However, the local zoning authority will be restricted by the covenants and restrictions carried in the deed.

**Comment:** I strongly recommend that some fashion of this same RAB committee exist as long as the property is being disposed of publicly, so we will make sure that it doesn't go in the wrong direction or anything harmful will happen to the community as a result of an oversight.

**Air Force Response:** We expect to support the continuation of a RAB until all property has been remediated to the transferable phase and properly deeded.

## COMMUNITY RELATIONS ACTIVITIES AT OU2

I. Letter to Orangecrest and Arnold Heights residential areas advising them of potentially hazardous materials in the newly discovered Site 40 landfill (January 1992)

II. Press release announcing the discovery at Site 40 (January 1992)

III. Press release announcing testing to be conducted at Site 40 (August 1992)

IV. Environmental Visitor's Day including tours of two Superfund Innovative Technology Evaluation (SITE) programs, one of them in OU2 (June 1993)

V. Public comment period for Sites 2, 17, and 36 EE/CAs (April-May 1994)

VI. Open house for Sites 2, 17, and 36 (May 1994)

VII. Workshop for Green Acres housing residents on proposed Site 17 action (May 1994)

VIII. Open house for Site 40 proposed cleanup action (October 1994)

IX. Public meeting on the planned removal action at Site 6 (January 1995)

X. Public comment period for Draft OU2 Remedial Investigation (June-July 1995)

XI. Public comment period for Draft OU2 Feasibility Study (July-August 1995)

XII Public comment period and public meeting for the draft site specific removal action memorandum for Site 6 (August-September 1995)

XIII. Public comment period and public meeting for the modification to the site specific removal action memorandum for Site 6 (February-April 1996)

XIV. Public comment period and public hearing for the Proposed Plan (September-October 1997)

XV Public comment period and public meeting for the Proposed Plan 2000 Fact Sheet (August - September 2000)

# APPENDIX B - ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX

| Document Date | AR number | Title | Author |
|---|---|---|---|
| Apr-84 | 2 | Phase I, Records Search Report | CH2M Hill |
| Sep-85 | 319 | Phase II Stage 1, Technical Operations Plan | Engineering-Science, Inc. |
| Mar-87 | 8 | Phase II Stage 1, Confirmation/Quantification Report, Vol I of | Engineering-Science, Inc. |
| Mar-87 | 9 | Phase II Stage 1, Confirmation/Quantification Report, Vol II of | Engineering-Science, Inc. |
| Mar-87 | 10 | Phase II Stage 1, Confirmation/Quantification Report, Vol III of | Engineering-Science, Inc. |
| Apr-87 | 318 | Phase II Stage 2, Technical Operations Plan | Engineering-Science, Inc. |
| Jun-88 | 15 | Phase II Stage 2, Confirmation/Quantification Report, Vol I of V | Engineering-Science, Inc. |
| Jun-88 | 16 | Phase II Stage 2, Confirmation/Quantification Report, Vol II of | Engineering-Science, Inc. |
| Jun-88 | 17 | Phase II Stage 2, Confirmation/Quantification Report, Vol III of | Engineering-Science, Inc. |
| Jun-88 | 18 | Phase II Stage 2, Confirmation/Quantification Report, Vol IV of V | Engineering-Science, Inc |
| Jun-88 | 19 | Phase II Stage 2, Confirmation/Quantification Report, Vol V of V | Engineering-Science, Inc |
| Jun-88 | 371 | Report of Survey Findings, UST Survey | Hazwrap Support Contractor Office |
| Sep-90 | 53 | Federal Facility Agreement | EPA Region IX, California Department of Health Services, California Regional Water Quality Control Board |
| Dec-91 | 136 | PA/SI, Stage 5, Draft Site Characterization Summary, 15th Air Force Sites, Vol I of IV | Tetra Tech, Inc. |
| Dec-91 | 137 | PA/SI, Stage 5, Draft Site Characterization Summary, 15th Air Force Sites, Vol II of IV | Tetra Tech, Inc. |
| Dec-91 | 138 | PA/SI, Stage 5, Draft Site Characterization Summary, 15th Air Force Sites, Vol III of IV | Tetra Tech, Inc. |
| Dec-91 | 139 | PA/SI, Stage 5, Draft Site Characterization Summary, 15th Air Force Sites, Vol IV of IV | Tetra Tech, Inc. |
| Jan-92 | 428 | Stage 5, ITIR, Soil Gas Surveys, HQ 15AF and DRMO Sites | Tetra Tech, Inc. |
| Jan-92 | 446 | Stage 5, ITIR, Geophysical Surveys, HQ 15AF and DRMO | Tetra Tech, Inc. |
| Jan-92 | 156 | Stage 5, Draft Site Characterization Summary, ITIR, Vol I of II, HQ 15AF Area Sites | Tetra Tech, Inc |
| Jan-92 | 157 | Stage 5, Draft Site Characterization Summary ITIR, Vol II of Vol II, Appendices A-D, HQ 15AF Area Sites | Tetra Tech, Inc. |
| Apr-92 | 169 | Aerial Photographic Analysis of Study Area | EPA Region IX |
| Apr-92 | 439 | Stage 5, Final Draft ITIR, Soil Gas Survey, HQ 15AF and DRMO Area Sites | Tetra Tech, Inc |
| Apr-92 | 450 | Final Draft ITIR, Analytical Data, DRMO Sites, LF-40 | Tetra Tech, Inc. |
| Apr-92 | 431 | Stage 5, Final Draft ITIR, Expanded Source Investigation, HQ 15AF Central Area Sites and LF-40 | Tetra Tech, Inc. |
| Apr-92 | 449 | Final Draft ITIR, Analytical Data, HQ 15AF Central Area Sites, LF-40 | Tetra Tech, Inc |
| Aug-92 | 195 | Stage 5, SAP Addendum, OU-2 | Tetra Tech, Inc. |
| Aug-92 | 196 | Stage 5, Work Plan Addendum, OU-2 | Tetra Tech, Inc. |
| Dec-92 | 425 | QAPP, Supplement to SAP Addendum, OU-2 | Tetra Tech, Inc. |
| Feb-93 | 6 | Soil Gas Survey, ITIR, OU-2 | Tetra Tech, Inc. |
| Jun-94 | 255 | EE/CA, Final Report, Subsurface Investigation and Removal Action, WP-17 | Tetra Tech, Inc |
| Jul-94 | 130 | Stage 5, Supplement to Work Plan Addendum and SAP Addendum, OU-2 | Tetra Tech, Inc |
| Oct-94 | 350 | Summary of Subsurface Investigation and Removal Action, Analytical Results, WP-17 | Tetra Tech, Inc |
| Nov-94 | 372 | Draft Channel Construction Plan, Rapid Response, LF-40 | OHM Remediation Services Corp. |
| Jan-95 | 433 | Groundwater Flow and Transport Model Preliminary Model Calibration, Draft Report, Appendix, Vol I of II | Tetra Tech, Inc. |
| Jan-95 | 434 | Groundwater Flow and Transport Model Preliminary Model Calibration, Draft Report, Appendix, Vol II of II | Tetra Tech, Inc |
| Feb-95 | 358 | Site Specific Removal Action Memorandum, LF-06 | IT Corp. |
| Feb-95 | 376 | Stage 5, Analytical Data, ITIR, Vol I of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 377 | Stage 5, Analytical Data, ITIR, Vol II of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 378 | Stage 5, Analytical Data, ITIR, Vol III of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 379 | Stage 5, Analytical Data, ITIR, Vol IV of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 380 | Stage 5, Analytical Data, ITIR, Vol V of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 381 | Stage 5, Analytical Data, ITIR, Vol VI of XIII, OU-2 | Tetra Tech, Inc. |

| Document Date | AR number | Title | Author |
|---|---|---|---|
| Feb-95 | 382 | Stage 5, Analytical Data, ITIR, Vol VII of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 383 | Stage 5, Analytical Data, ITIR, Vol VIII of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 384 | Stage 5, Analytical Data, ITIR, Vol IX of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 385 | Stage 5, Analytical Data, ITIR, Vol X of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 386 | Stage 5, Analytical Data, ITIR, Vol XI of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 387 | Stage 5, Analytical Data, ITIR, Vol XII of XIII, OU-2 | Tetra Tech, Inc. |
| Feb-95 | 388 | Stage 5, Analytical Data, ITIR, Vol XIII of XIII, OU-2 | Tetra Tech, Inc. |
| Jun-95 | 469 | Final Rapid Response Time Critical Removal Action Report, Vol I of II, LF-40 | OHM Remediation Services Corp |
| Jun-95 | 470 | Final Rapid Response Time Critical Removal Action Report, Vol II of II, LF-40 | OHM Remediation Services Corp |
| Oct-95 | 476 | Final Site Specific Removal Action Memorandum | IT Corp. |
| Jan-96 | 571 | Excavation of Diesel Contaminated Soil, Technical Information Report, LF-06 | IT Corp |
| Jan-96 | 251 | USFWS Letter to March ARB Concerning Biological Opinion Concerning a Proposed Land Use Strategy and Management of Stephens' Kangaroo Rats | US Fish and Wildlife Service |
| Feb-96 | 581 | Modification to the Site-Specific Removal Action Memorandum, SS-01, SD-09, WP-25, and 12 UST Locations, and Consolidation of LF-06 | IT Corp |
| Apr-96 | 556 | Final Project Report, Rapid Response Removal Actions, Vol I of III, LF-20, WP-26 | OHM Remediation Services Corp |
| Apr-96 | 557 | Final Project Report, Rapid Response Removal Actions, Vol II of III, LF-20, WP-26 | OHM Remediation Services Corp |
| Apr-96 | 558 | Final Project Report, Rapid Response Removal Actions, Vol III of III, LF-20, WP-26 | OHM Remediation Services Corp |
| Jun-96 | 658 | Draft Examination of Anomalies Located by Multi-Spectral Survey | IT Corp |
| Jan-97 | 730 | Closure Report, Removal of Wastes, Vol I of II, LF-20, WP-26B | IT Corp. |
| Jan-97 | 731 | Closure Report, Removal of Wastes, Vol II of II, LF-20, WP- | IT Corp. |
| Jan-97 | 732 | Closure Report, Removal of Wastes, WP-26A | IT Corp. |
| Feb-97 | 737 | Closure Report, Vol I of II, WP-25 | IT Corp. |
| Feb-97 | 738 | Closure Report, Vol II of II, WP-25 | IT Corp. |
| Feb-97 | 739 | Closure Report, Removal of Wastes, Vol I of II, SS-12 | IT Corp. |
| Feb-97 | 740 | Closure Report, Removal of Wastes, Vol II of II, SS-12 | IT Corp. |
| Feb-97 | 741 | Removal of Wastes Report, Vol I of II, LF-24 | IT Corp. |
| Feb-97 | 742 | Removal of Wastes Report, Vol II of II, LF-24 | IT Corp. |
| Feb-97 | 743 | Removal of Wastes Report, Vol I of II, LF-03 | IT Corp. |
| Feb-97 | 744 | Removal of Wastes Report, Vol II of II, LF-03 | IT Corp. |
| Feb-97 | 892 | Final Total Dissolved Solids Evaluation, Vol I of III | Tetra Tech, Inc. |
| Feb-97 | 893 | Final Total Dissolved Solids Evaluation, Vol II of III, | Tetra Tech, Inc. |
| Feb-97 | 894 | Final Total Dissolved Solids Evaluation, Vol III of III, | Tetra Tech, Inc. |
| Feb-97 | 895 | Final Trend Analysis | Tetra Tech, Inc. |
| Apr-97 | 787 | Closure Report, Removal of Wastes, Vol I of II, LF-06 | IT Corp. |
| Apr-97 | 788 | Closure Report, Removal of Wastes, Vol II of II, LF-06 | IT Corp. |
| Jul-97 | 678 | RI/FS, Draft Final Report, Vol I of XVII, OU-2 | Tetra Tech, Inc. |
| Jul-97 | 679 | RI/FS, Draft Final Report, Vol II of XVII, OU-2 | Tetra Tech, Inc. |
| Jul-97 | 680 | RI/FS, Draft Final Report, Vol III of XVII, OU-2 | Tetra Tech, Inc. |
| Jul-97 | 681 | RI/FS, Draft Final Report, Vol IV of XVII, OU-2 | Tetra Tech, Inc. |
| Jul-97 | 682 | RI/FS, Draft Final Report, Vol V of XVII, OU-2 | Tetra Tech, Inc. |
| Jul-97 | 766 | Final Site Characterization Report, ST-39 | Black & Veatch Waste Science, Inc. |
| Aug-97 | 794 | Groundwater Assessment, LF-06 | IT Corp. |
| Aug-97 | 855 | Draft Final Site Closure Report, Former Diesel UST Site, ST-35 | Parsons Engineering Science, Inc. |
| Sep-97 | 789 | As-Built Construction Report, Vol I of V, LF-06 | IT Corp. |
| Sep-97 | 790 | As-Built Construction Report, Vol II of V, LF-06 | IT Corp. |
| Sep-97 | 791 | As-Built Construction Report, Vol III of V, LF-06 | IT Corp. |
| Sep-97 | 792 | As-Built Construction Report, Vol IV of V, LF-06 | IT Corp. |
| Sep-97 | 793 | As-Built Construction Report, Vol V of V, LF-06 | IT Corp. |
| Sep-97 | 795 | Post Closure Monitoring and Maintenance Plan, LF-06 | IT Corp. |
| Sep-97 | 802 | 96 Annual Groundwater Report, Vol I of II | Tetra Tech, Inc. |
| Sep-97 | 803 | 96 Annual Groundwater Report, Vol II of II, Appendices | Tetra Tech, Inc. |

| Document Date | AR number | Title | Author |
|---|---|---|---|
| Sep-97 | 804 | Management Action Plan | Montgomery Watson |
| Sep-97 | 819 | Basewide Groundwater Monitoring Program, Groundwater Flow and Transport Model, 96 Model Calibration and Predictions | Tetra Tech, Inc. |
| Sep-97 | 843 | Closure Report, Removal of Waste, Vol I of II, LF-06 | IT Corp. |
| Sep-97 | 844 | Closure Report, Removal of Waste, Vol II of II, LF-06 | IT Corp. |
| Oct-97 | 814 | Characterization of Wastes, Vol I of IV, LF-24 | IT Corp. |
| Oct-97 | 815 | Characterization of Wastes, Vol II of IV, LF-24 | IT Corp. |
| Oct-97 | 816 | Characterization of Wastes, Vol III of IV, LF-24 | IT Corp. |
| Oct-97 | 817 | Characterization of Wastes, Vol IV of IV, LF-24 | IT Corp. |
| Oct-97 | 931 | RA, Final Field Summary Report, DP-30 | OHM Remediation Services Corp. |
| Apr-98 | 840 | Final Proposed Monitoring Strategy for Landfill Sites | Tetra Tech, Inc. |
| Jul-99 | 1030 | Final O&M Work Plan, OU-2 LF-06 | Tetra Tech, Inc., Black & Veatch Waste Science, Inc. |
| Nov-99 | 1028 | Completion of Construction Report, Erosion Protection of Drainage Channel, LF-06 | IT Corp |
| Dec-99 | TBD | Finding of Suitability to Transfer Parcels A-10 and H-1 | AFBCA |
| Aug-00 | TBD | Finding of Suitability to Transfer Parcels F & K1 | AFBCA |
| May-01 | 1096 | Final Annual Monitoring Report, 99-00 | Montgomery Watson |

TBD -- to be determined

# APPENDIX C - ARARs

# APPENDIX C - ARARs

**Documentation of Applicable or Relevant and Appropriate Requirements (ARARs) for Selected Remedies**

**TABLE C-1: Sites 6, 12, 17, and 19, Relevant and Appropriate State Requirements**

| Requirement | ARAR Status | Source | Description |
|---|---|---|---|
| **Action Specific** | | | |
| Land Use Covenant | Relevant and Appropriate | CCR, title 22, section 67391.1(a) | Requires imposition of appropriate limitations on land use by recorded land use covenant when hazardous substances remain on the property at levels that are not suitable for unrestricted use of the land. |
| Land Use Covenant | Relevant and Appropriate | CCR, title 22, section 67391.1(b) | Requires that the cleanup decision document contain an implementation and enforcement plan for land use limitations. |
| Land Use Covenant | Relevant and Appropriate | CCR, title 22, section 67391.1(d) | Requires that the land use covenant be recorded in the county where the land is located. |
| Land Use Covenant | Relevant and Appropriate | CCR, title 22, section 67391.1(i) | Definitions |
| Land Use Covenant | Relevant and Appropriate | CA Civil Code Section 1471(a) & (b) | Specifies requirements for land use covenants to apply to successors in title to the land. |

## Table C-2

## State Requirements Applicable or Relevant and Appropriate to the Site 6 Removal Action and O&M Work Plan

| Requirement | ARAR Status | Source | Description |
|---|---|---|---|
| **Chemical Specific** | | | |
| National Primary Drinking Water Standards | Relevant and Appropriate | 40 CFR Part 141.61 | Maximum contaminant levels and monitoring and analytical requirements for organic chemicals |
| California Maximum Contaminant Levels – Organic Chemicals | Relevant and Appropriate (if more stringent than the 40 CFR 141.61 standard) | CCR, title 22, section 64444 – Primary Standards | Provides numerical contaminant limits for certain organic chemicals in drinking water. |
| **Action Specific** | | | |
| Monitoring Requirements | Applicable | CCR, title 27, section 20385 | Release monitoring requirements for solid waste management units |
| General Closure and Post-Closure Maintenance | Applicable | CCR, title 27, section 20950(a), (e) | General closure and post-closure maintenance standards for solid waste management units |
| General Post-Closure Maintenance | Applicable | CCR, title 27, section 21090(b)(1), (c), (e)(2) | Closure and post-closure maintenance requirements for solid waste landfills. |
| Gas Monitoring and Control During Closure and Post-closure | Applicable | CCR, title 27, section 20921 | Methane must not exceed 5% at the property boundary or other approved monitoring point |
| Gas Monitoring | Applicable | CCR, title 27, section 20923 | Gas monitoring program required |
| Perimeter Monitoring Network | Applicable | CCR, title 27, section 20925 | Perimeter subsurface monitoring wells required |
| Structure Monitoring | Applicable | CCR, title 27, section 20931 | If there are structures, gas monitoring required |
| Monitored Parameters | Applicable | CCR, title 27, section 20932 | Methane and any specified trace gases must be sampled |
| Monitoring Frequency | Applicable | CCR, title 27, section 20933 | Quarterly monitoring required, at a minimum |
| Reporting | Applicable | CCR, title 27, section 20934 | Results of monitoring to be submitted |
| Control | Applicable | CCR, title 27, section 20937 | Requires gas control system if methane concentrations exceed compliance levels |
| Post-closure Maintenance | Applicable | CCR, title 27, section 21180 | The landfill's final cover and operating systems must be maintained and monitored for no less than 30 years following closure. |
| Post-closure Land Use | Applicable | CCR, title 27, section 21190 | Specifies restrictions and considerations in future land use |

## Table C-3

## State Requirements Applicable or Relevant and Appropriate to the March ARB Quality Program Plan, as to Site 12

| Requirement | ARAR Status | Source | Description |
|---|---|---|---|
| **Chemical Specific** | | | |
| National Primary Drinking Water Standards | Relevant and Appropriate | 40 CFR Part 141.61 | Maximum contaminant levels and monitoring and analytical requirements for organic chemicals |
| California Maximum Contaminant Levels – Organic Chemicals | Relevant and Appropriate (if more stringent than the 40 CFR 141.61 standard) | CCR, title 22, section 64444 – Primary Standards | Provides numerical contaminant limits for certain organic chemicals in drinking water. |

| Requirement | | | |
|---|---|---|---|
| **Action Specific** | | | |
| Water Quality Monitoring | Relevant and Appropriate | CCR, title 22, section 66264.97 | Identifies requirements for water quality monitoring and monitoring systems for owners and operators of hazardous waste facilities |